

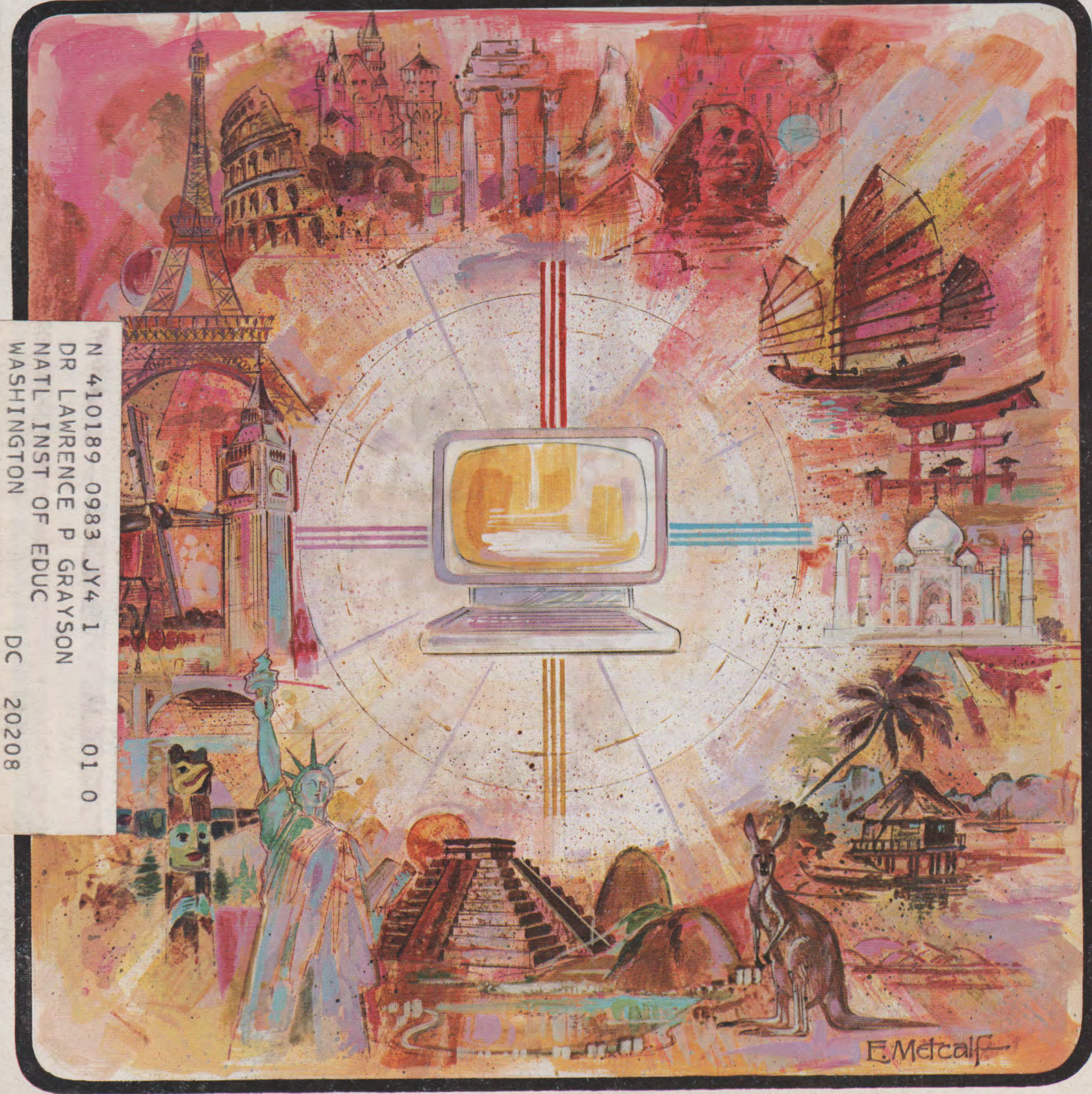
T · H · E

TECHNOLOGICAL HORIZONS IN EDUCATION

JOURNAL

Vol. 11, No. 4, January, 1984

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Computers in Education Worldwide

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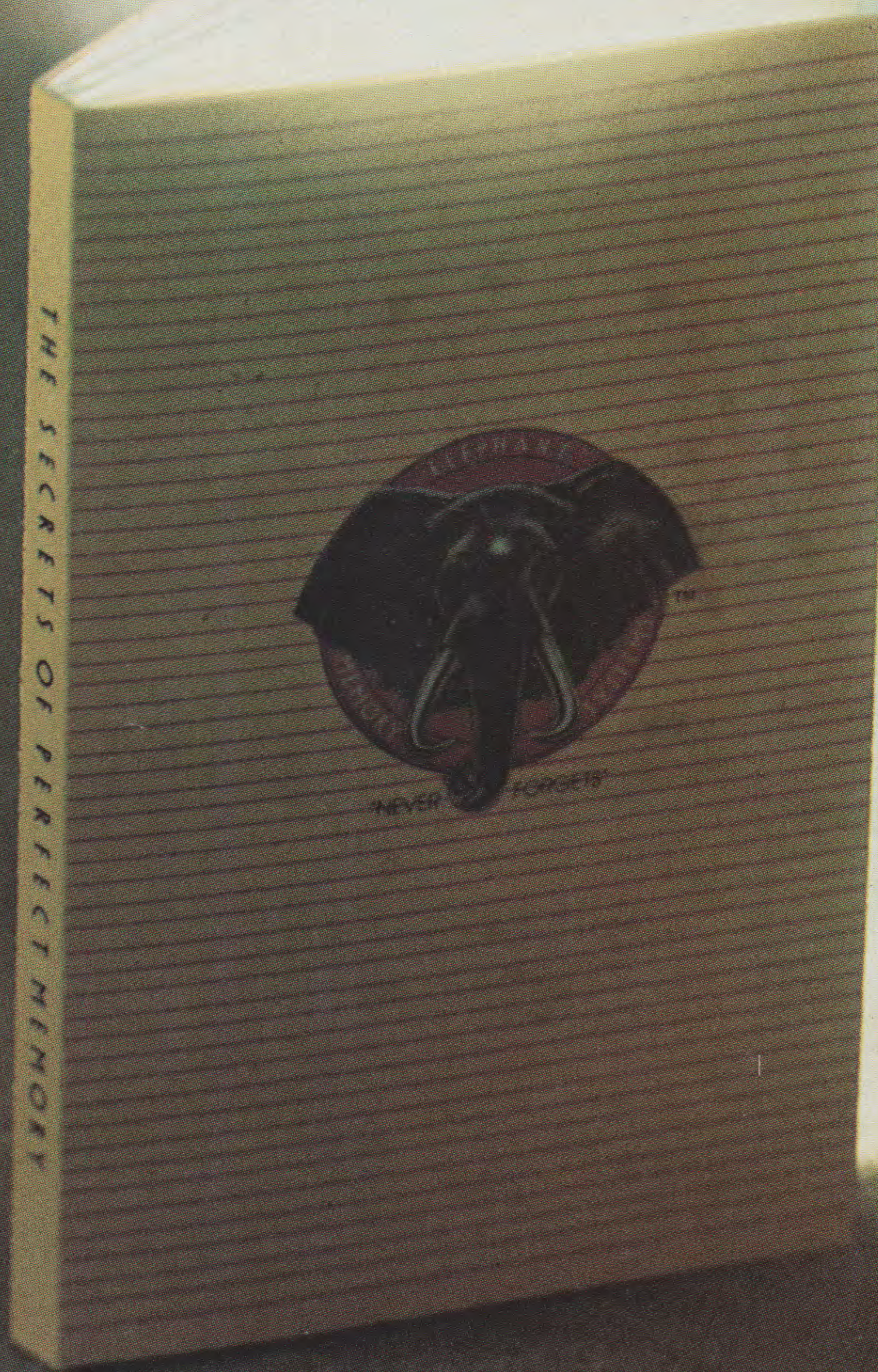
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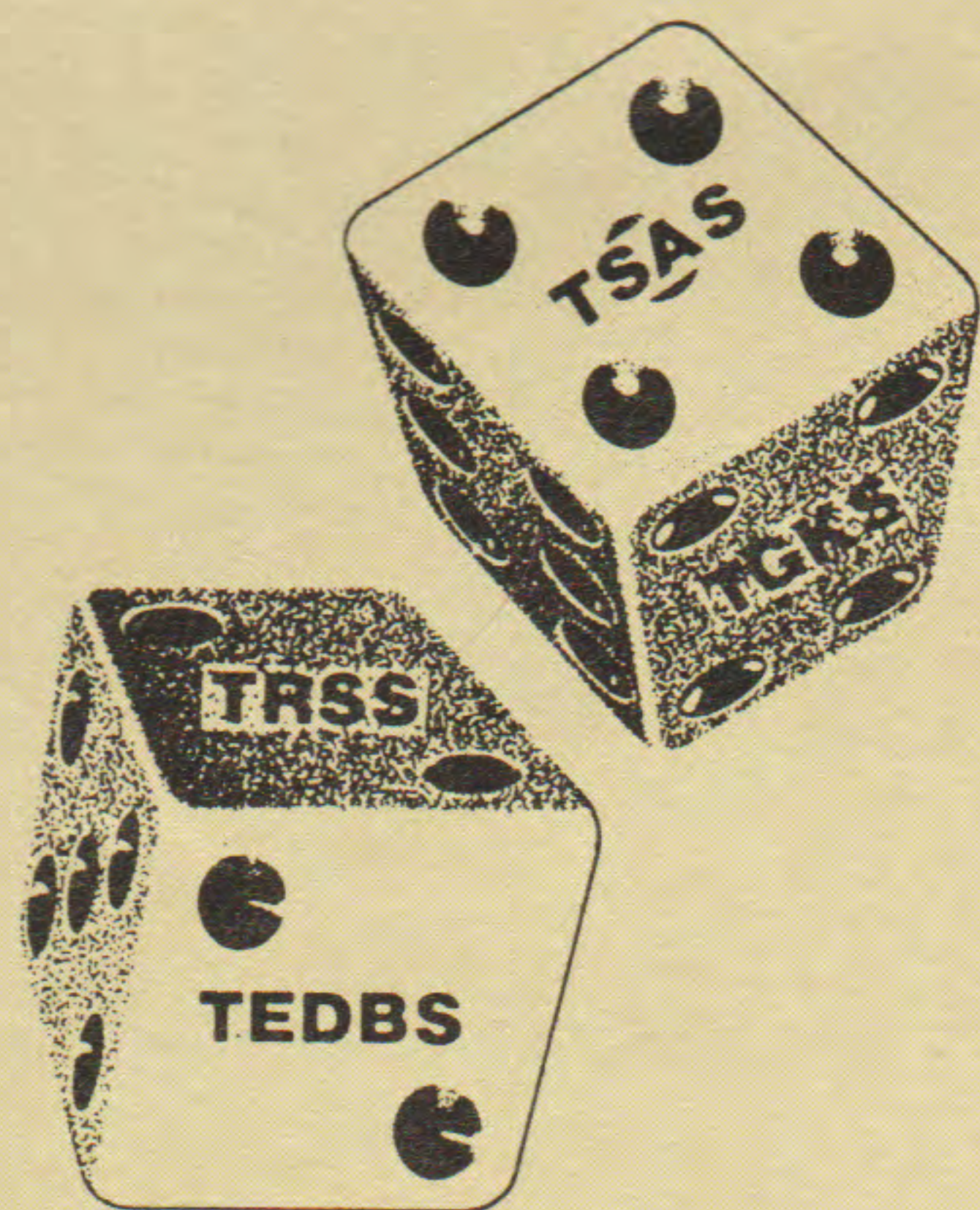
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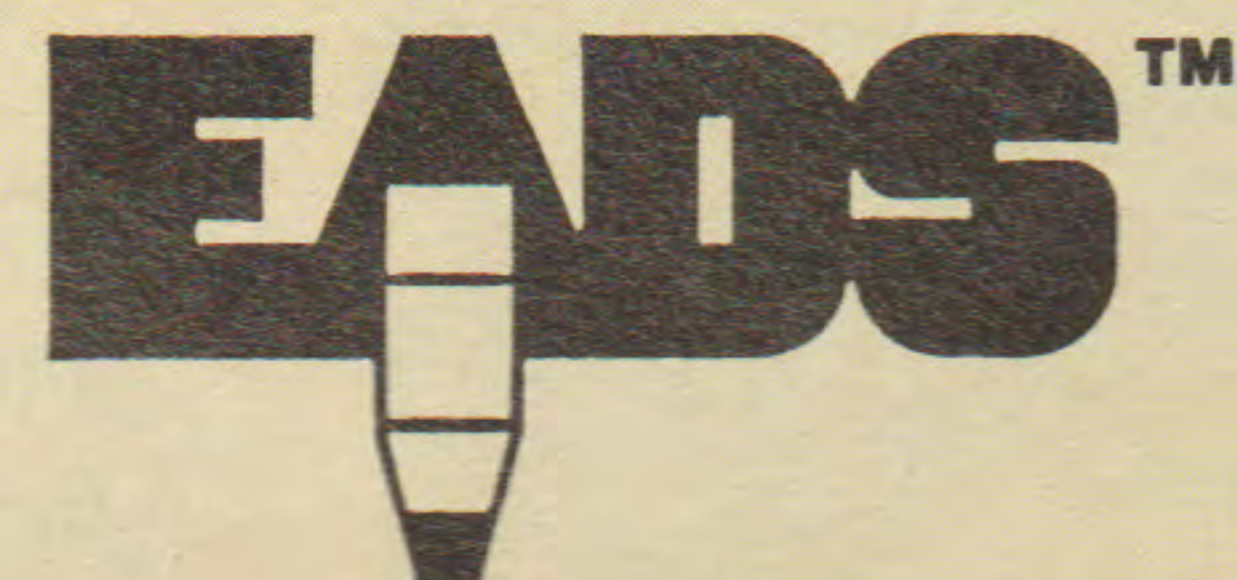
TGKS allows schools to do their own grade reporting, class and school ranking, mark analysis, and credit updating. Semester/quarter exam grades, credits, grade point average and class rank for each student are all automatically updated by TGKS. TGKS works with TSAS to automatically post quarter-by-quarter absences. TGKS makes the recording and printing of a school's semester's grades a one-day operation.

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For more information contact:



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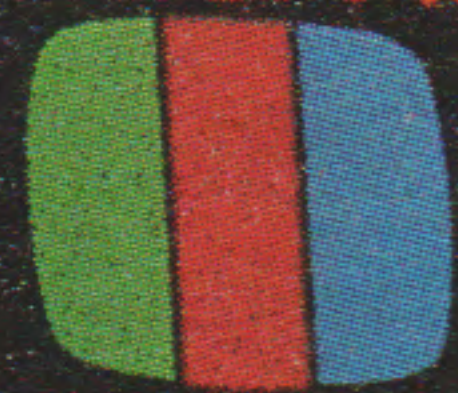
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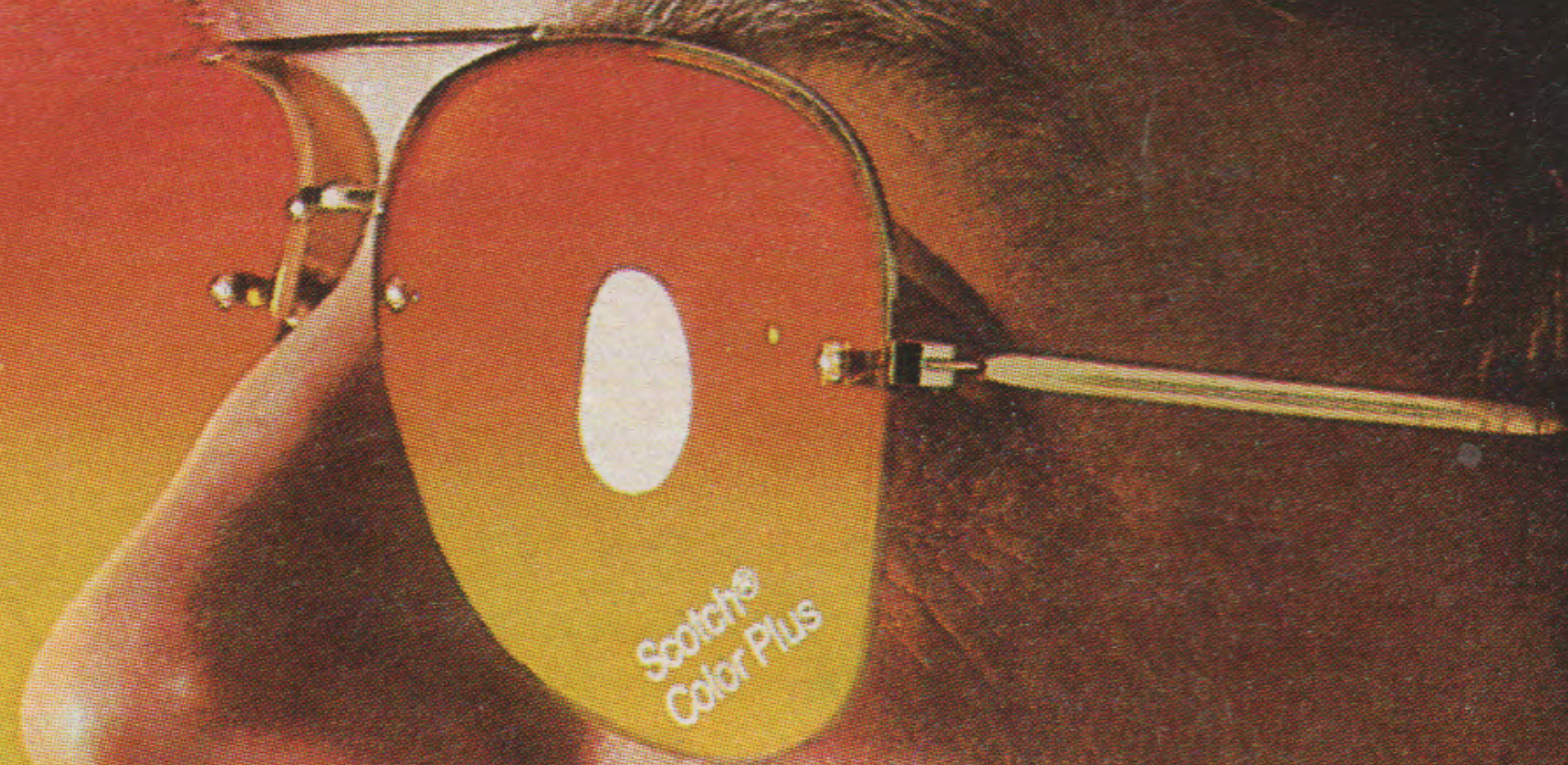
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JANUARY, 1984

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Teaching Computing Across the Curriculum: A Canadian Viewpoint, by Christopher K. Knapper and Barry L. Wills, University of Waterloo, Canada. For institutions of higher education in Canada, the use of computer-aided instruction is miniscule. Instead, students of the sciences are taught how to program computers, while students of the arts are shown how to use computers within their disciplines. The experiences at one of those universities are described by a pair of educators who were involved in curriculum development 98

The Role of the Computer Centre In Informatics Education, By Glauco Bertocchi and Mirella Schaerf, Centro di Calcolo Interfacolta, University of Rome, Italy. High schools in Italy do not, as yet, provide college-bound students with any type of computer training. As a result, that nation's largest university has established a computer science center (Centro di Calcolo Interfacolta) and given it two functions: conduct computer science courses; and train teachers of other disciplines in methods of showing students how to use computers in their regular curricula. Five years of history and development of the center are described by two experts 105

A Management-Oriented System Design Method Used to Train Systems Engineers at Japan's Institute of Information Technology, by Toshio Nishimura, University of Tsukuba, and Yoshihiro Maekawa, Yokohama College of Commerce, Japan. In the 20 years since the first computers were installed in Japan the roles of systems engineers have changed. As a result, two leading educators developed a new teaching philosophy which has been successfully used for eight years by a specialized institution 108

The Design and Implementation of an Introductory Computer Literacy Course for Teachers and Educational Decision-Makers, by Chen David and Nachmias Rafi, Tel Aviv University School of Education, Israel. Fostered by commercial computer companies and other interest groups, the implementation of computers in the Israeli educational system has been both rapid and uncontrolled. Teachers either resent the new technology, or are unrealistically enthusiastic. To quickly bring order out of chaos, two specialists helped develop a split curriculum which enables teachers to follow a more logical path of adoption ... 113

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ON OUR COVER

Though the United States of America is generally acknowledged to be the birthplace of the computer as it is known today, it is not alone as it places greater emphasis on training its youth to use the electronic devices. The use of and the teaching about Computers in Education Worldwide is truly taking on global significance due in large part to the ability of the computer to catapult otherwise economically disadvantaged nations into the modern economic world. Especially for T.H.E. Journal, Artist Eugene Metcalf portrays the computer as a universal force influencing all nations alike.



8 JANUARY, 1984

Teaching Business EDP, by P. Mertens, University of Erlangen-Nuremburg, West Germany. In West Germany, electronic data processing is usually taught in management or business administration departments, with little done in purely computer science curricula. With lecture classes running as high as 600 students per instructor, specialized teaching strategies had to be developed to maximize individual learning opportunities in a subject having a broad range 119

Microcomputers and Informatics Education at the University Level, by Todor Boyanov, University of Sofia Institute of Mathematics, Bulgaria. In view of the advent of widespread use of microcomputers in this Balkan nation, informatics education for all college students is considered both possible and necessary. As described by a leading specialist, however, this posture has necessitated new methodology and pedagogic strategies of instructing teachers 123

Presenting Computer Literacy for the B.C. Generation at the Smithsonian Institution, by C. Dianne Martin, George Washington University, and Rachelle S. Heller, University of Maryland. Though computer literacy has become the key educational issue of the 1980s, little attention has been paid to adults over the age of 25 who received their formal education Before Computers (B.C.). As a beginning step to satisfy that need, and at the request of the Smithsonian Institution, the authors and two associates developed and presented highly popular one-day seminars. Their article contains a description 125

Functional Distance and the Attitudes of Educators Toward Computers, by Dr. Cathleen M. Norris and Dr. Barry Lumsden, North Texas State University. Two nationally-recognized researchers draw a fascinating comparison between studies on the acceptance of differing nationalities, and cyberphobia, or fear of computers, by classroom teachers. Their correlations indicate that distance engenders admiration 129

Cable Television: An Aid to Education, by Joseph H. Previty, Philadelphia Board of Education, Pennsylvania. A trustee of one of America's largest unified school districts describes the potential benefits to both students and teachers as cable television, with instructional channels, comes to his city 136

CAD Training in Industry and Education, by Thomas J. Lazear, T&W Systems, Inc., Huntington Beach, Calif. Before an assembly of a West Coast professional-industrial association, this business executive described the need for increased training in computer-aided design (CAD), and a symbiotic relationship between education and industry which could increase the supply of trained CAD operators 138

A Futurist Looks at EdTech, or Wheel-Reinventing Resconsidered, by Dr. Pauline Masterton, Florida Department of Education. Using a future-is-here-now approach, a state authority provides a unique description of the phenomenon taking place in the Sunshine State 143

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Editorial

The Ninth World Conference sponsored by the International Federation of Information Processing was held in Paris last September. I was privileged to attend as president of the American Federation of Information Processing Societies—a member organization representing the U.S.A. It is difficult to describe the excitement of delegates from 42 nations as they discussed a variety of topics on information processing. The main speakers at the opening session were particularly stimulating.

UNESCO Director General Amadou M. M'Bow declared that all countries have a primary responsibility to educate their citizens in computer literacy and in the application of that knowledge. He said it is important for all individuals everywhere to act with good conscience and solidarity, because the computer can unleash powers hitherto unknown.

French Prime Minister Pierre Mauroy challenged the audience to respond to the universal revolution which is occurring, describing it as a human, political and industrial opportunity. He said France plans to invest \$18 billion to become the third world power in the production of electronics, after the U.S. and Japan. This year, 20,000 microcomputers will be installed in French schools. Within three years, the government of France plans to establish 200 computer professionals to train the unemployed. And, France has joined with the United Kingdom and West Germany to form a new Joint Research Centre to study computers of the future, with emphasis on artificial intelligence.

A growing integration of computing and telecommunications was stressed by Groupe Beall Chairman Jacques Stern, who said the most pressing need is for software to become simpler and more efficient. He said we must provide networks to link homes and do away with distances. At the same time, he added, our task is to educate our children so we can plan ahead for a greater utilization of all our resources.

Among the many levels of computer literacy examined by delegates from Denmark, France, India, Morocco, the Soviet Union, the United Kingdom and the U.S.A. were transparent use of computers, such as in electronic games, bank terminals and washing machines; the need for access to a keyboard combined with the ability to read menus and understand results, as in computer-aided instruction and many business packages; the availability of easy programming languages such as BASIC, and the ability to write short programs of 30 to 100 instructions; and a requirement to make full use of computer languages and systems.

Other international sessions covered hardware architecture, software, networks, applications, social implications, standardization, and the need to use fewer programming languages. It was interesting to discover the almost universal agreement on the increasing need for supercomputers with expanded capacity, speed and power—all said to be essential.

In an unusual comment, the Japanese delegation said their nation now has a problem with the reeducation of women workers, the middle-aged and elderly employees displaced due to the installation of industrial robots and other computer-controlled equipment.

Certainly, the situation we face in America is worldwide. We will have an opportunity to exchange ideas with our international colleagues at the World Conference on Computers in Education in July, 1985, in Norwalk, Va. There, we can all learn from each other.

Sylvia Chapp
Editor-in-Chief

Calendar

January

8-14, San Jose, Calif. CADRE '84 Conference and Teachers Institute, San Jose State University. The computers in Art and Design, Research and Education (CADRE) conference will be held January 8 through 11, with the CADRE Institute following, January 11 through 14. The conference will include lectures, demonstrations and workshops by prominent artists of computer assisted art, design and performance. In an interactive symposium, researchers will discuss the philosophical issues of artificial intelligence, robotics and other social impacts of computer use. Electronic equipment and materials will be presented as they may be applied to the visual and performing arts. An in-service institute will be offered to kindergarten through 12th grade teachers designed to aid skills, process and curriculum development in computer-aided arts. San Jose University, Washington Square, San Jose, CA 95192, (408) 277-2555.

16-17, Washington, D.C. The Super Micros: The New 32-Bit Microprocessors, School of Engineering and Applied Science, George Washington University. This course is designed to teach the main architectural features of the 32-bit microprocessors and to teach participants to evaluate and select the processors for use in specific applications. During the first part of the course, architectural concepts, such as objects, capabilities, support for operating system functions and virtual memory management are covered. The detailed descriptions of the main architectural features are given for several microprocessors. Contact: Chip Blouin (800) 424-9773, (202) 676-8527 in Washington, D.C.

20-23, Dallas, Texas. NAVA/ICIA Convention and COMMTEX International. Dallas Convention Center. Seminars, special sessions, workshops and approximately 450 displays covering the newest A/V, video, microcomputer and other communications products. A/V-video groups representing education, organizational communications and others will meet at the convention to improve their use of technological media. NAVA/ICIA, 3150 Spring St., Fairfax, VA 22031, (703) 273-7200.

20-24, Dallas, Texas. 1984 Conference of the Association for Educational Communications and Technology, Dallas Convention Center. A professional meeting for educators and trainers who are concerned with using media and technology to improve instruction, this conference attracts people from career fields including: educational technology, educational administration, industrial training, library science, medicine, government, and religious education. The theme of the conference is "Technological Horizons: Human Perspectives." Three general sessions and more than 200 concurrent sessions, seminars, presentations and workshops will be held. The human component of the technological revolution will be discussed, as well as the effect of technology on human learning and quality of life. Futurist and teacher-of-the-year Lee Hay will address the first general session of the conference. It will be held in conjunction with the COMMTEX International Exposition. Association for Educational Communications and Technology, 1126 16th St., N.W., Washington, D.C. 20036, (202) 466-4780.

23-25, Las Vegas, Nev. Teaching Math With Microcomputers, Hacienda Resort Hotel and Casino. This is one of a series of microcomputer seminars conducted in various cities across the country by the National Council of Teachers of Mathematics. An intensive two-day program, it is designed to introduce microcom-

puters to teachers and supervisors of mathematics education at the elementary, intermediate and secondary school levels. NCTM Seminar Series, 1906 Association Drive, Reston, VA 22091. (703) 620-9840.

25-27, East Rutherford, N.J. Business Telecommunications Exposition, Giants Stadium. This conference is directed toward managers in the following fields: telecommunications, voice communications, data communications, office automation, word processing, purchasing, and video communications. T.E.G., Inc., 9128 Columbia Ave., North Bergen, NJ. 07040 (201) 662-1318

25-28, Reno, Nev. Technology in Special Education. Sponsored by the Council for Exceptional Children and the Council of Administrators of Special Education, the conference will include ten hour workshops in technology in special education. The workshops will be held two days prior to the conference, which will begin January 27. Continuing education units may be earned by workshop participants. Council for Exceptional Children, 1920 Association Drive, Reston, VA 22091 (703) 620-3660.

February

2-4, San Diego, Calif. Society for Computer Simulation (SCS) Main conference, Bahi Hotel. Four separate conferences will be held over the two-day period. They are Modeling and Simulation on Microcomputers; Simulation in Strongly Typed Languages; Aerospace Simulation, and Simulation in Health Care Delivery Systems. The concept of holding several conferences on related subjects is to provide the personal contacts and in-depth learning opportunities of a highly specialized meeting while retaining the interdisciplinary insights provided by a large conference. Contact:

(continued on page 14)

Calendar

January

8-14, San Jose, Calif. CADRE '84 Conference and Teachers Institute, San Jose State University. The computers in Art and Design, Research and Education (CADRE) conference will be held January 8 through 11, with the CADRE Institute following, January 11 through 14. The conference will include lectures, demonstrations and workshops by prominent artists of computer assisted art, design and performance. In an interactive symposium, researchers will discuss the philosophical issues of artificial intelligence, robotics and other social impacts of computer use. Electronic equipment and materials will be presented as they may be applied to the visual and performing arts. An in-service institute will be offered to kindergarten through 12th grade teachers designed to aid skills, process and curriculum development in computer-aided arts. San Jose University, Washington Square, San Jose, CA 95192, (408) 277-2555.

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(continued on page 14)

Who Uses CompuPro?



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High school administrators in Albany, California wanted their students to learn on the kind of sophisticated computers they will encounter in their chosen occupations. With the help of parents in the computer field, they installed two multi-user CompuPro systems.

Dr. Richard Rosenquist, assistant superintendent of schools, explains, "We're coming to the point where the best avenue to

a career may well be competency in computers."

George Fosselius, the computer sciences teacher at Albany High, chose CompuPro's System 816™ because of its high performance, reliability and ease of upgrading. He wants to develop custom programs for the learning disabled, color graphics and an electronic bulletin board through which all schools can share software innovations. "The way

we have the CompuPro set up, it's so powerful that I can't see the limits yet," he says.

In halls of learning and fields of endeavor, CompuPro delivers performance, quality and reliability. Call (415) 786-0909 ext. 206 for the location of the Full Service CompuPro System Center nearest you.

Albany High School's CompuPro systems were integrated by Gifford Computer Systems of San Leandro, CA.

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Calendar (continued)

February

Gloria Rico, SCS, P.O. Box 2228, La Jolla, CA 92038, (619) 459-3888.

3-6, Las Vegas, Nev. 68th Annual NASSP Convention & Exhibit, Las Vegas Convention Center. The theme of the convention of the National Association of Secondary School Principals is: "Excellence: The Principal's Commitment." The convention will feature a large exhibit area, seminars, concurrent sessions, school visits, and discussion sessions. To exhibit at the convention send a \$250 deposit to: Exhibits Coordinator, NASSP, 1904 Association Drive, Reston, VA 22091, (703) 860-0200.

7, Orlando, Fla. Ten Educational Computing Workshops. Sponsored by the Association for Educational Data Systems (AEDS), the workshops will be held prior to the Florida Instructional Computing Conference Workshops. The subjects of the workshops are: Beginning Computer Literacy; Advanced Computer Literacy/BASIC Programming; PASCAL: Language Philosophy and Features; Using Word Processing to Teach Composition; Programming LOGO Graphics; Teaching Math with LOGO; Computer Tools for Administrators; Integrating CAI and Videotape for Science and Math Instruction; A Short Course in Robotics, and Courseware Review and Selection. The fees for the workshops are \$35 to \$45. They will be filled on a first-come, first-served basis. Contact: Linda Corso, AEDS, 1201 16th St., N.W., Washington, D.C. 20036, (202) 822-7845.

13-16, San Diego, Calif. Digital Communications and Computer Network Systems, The Seapoint Hotel. A continuing engineering education course, this presentation provides an understanding of the essential theory, techniques and

applications of the principal elements of network control systems without the use of advanced mathematics. The discussion concentrates on practical applications. There is no prerequisite for the course. The course is presented by the George Washington University School of Engineering and Applied Science. Contact: Shirley Forlenzo (800) 424-9773 or in Washington, D.C., (202) 676-8530.

14-16, Philadelphia, Pa. The Twelfth Annual ACM Computer Science Conference, Franklin Plaza Hotel. The traditional emphasis on abstracts of current research will be blended with invited papers, panels and refereed papers. The central themes on each of the three days are: "Factory of the Future," "Coping with Small Computers," and "Social and Ethical Implications of Computers." In addition to the technical presentations, the conference features more than 50 computer and instructional material exhibits, the finals of the International Student Programming Contest and the annual Employment Register. Contact: Dr. Frank Friedman, ACM Computer Science Conference Chairman, Computer and Information Science Department, Temple University, Philadelphia, PA 19122, (215) 787-1912.

16-17, Philadelphia, Pa. The Technical Symposium on Computer Science Education of the ACM Special Interest Group on Computer Science Conference (SIGCSE). The symposium will be held in conjunction with the 1984 ACM Computer Science Conference. Contact: Dr. Richard H. Austing, Chairman, Department of Computer Science, University of Maryland, College Park, MD 20742, (301) 454-2004.

20-22, Los Angeles, Calif. 1984 Office Automation Conference, Los Angeles Convention Center. The theme of the conference this year is "Office Automation and You." A conference program is developed along five tracks to accommodate five basic areas: managers and adminis-

trators, technology managers and planners, analysts consultants and implementors, product designers and developers, and users. A series of half- and full-day professional development seminars will address a variety of topics in the office automation field. American Federation of Information Processing Societies, Inc., 1815 Lynn St., Arlington, VA 22209, (703) 558-3617.

21-23, New Orleans, La. SOFTCON, Louisiana Superdome. An international conference and trade fair for the software industry, the event will feature more than 100 seminars, panel discussions and workshops plus approximately 1,000 displays. Registration fee for the non-public show is \$15 per person. Sessions will cover new software and data interchange standards. Northeast Expositions, 822 Boylston St., Chestnut Hill, MA 02167, (800) 841-7000.

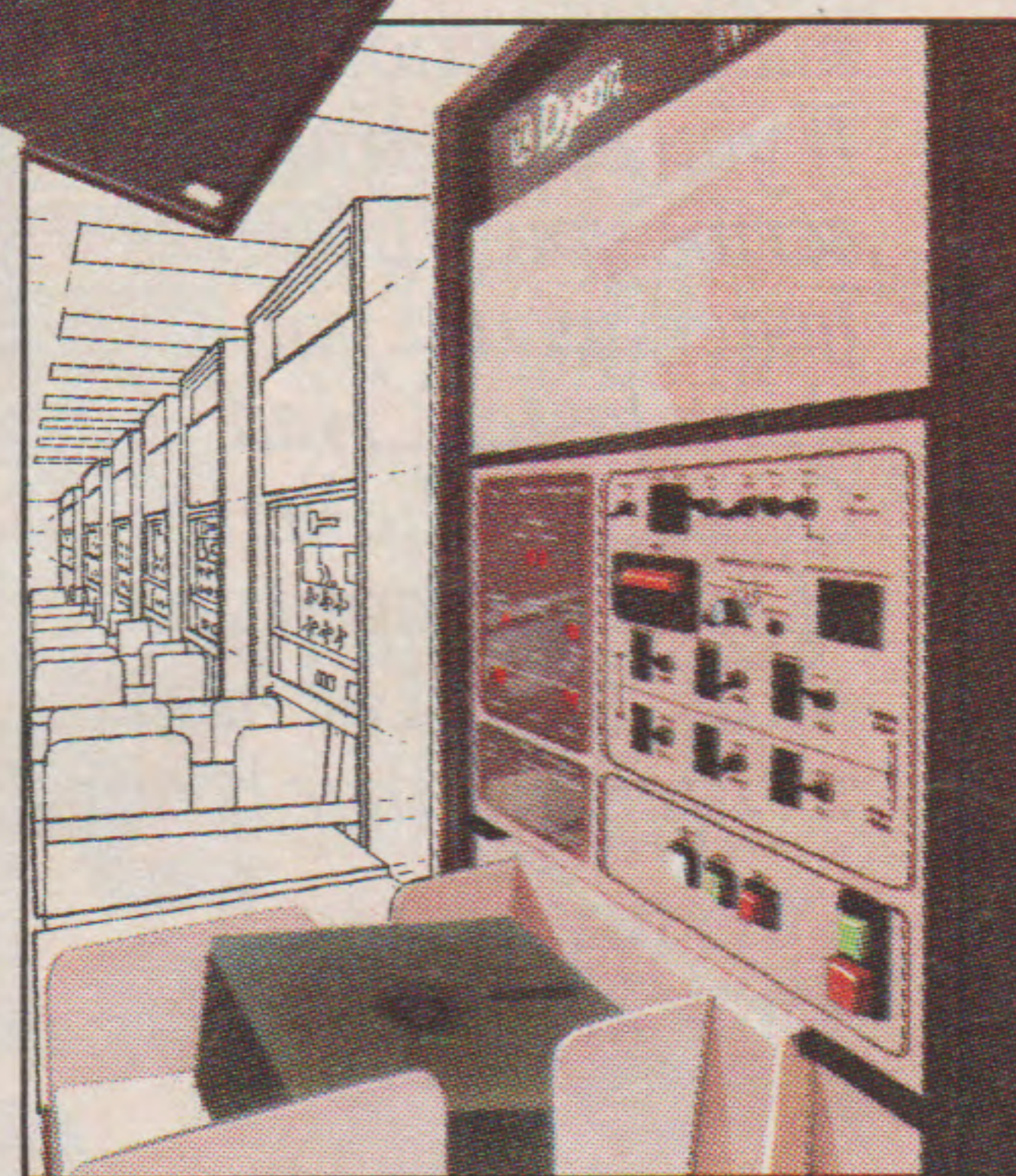
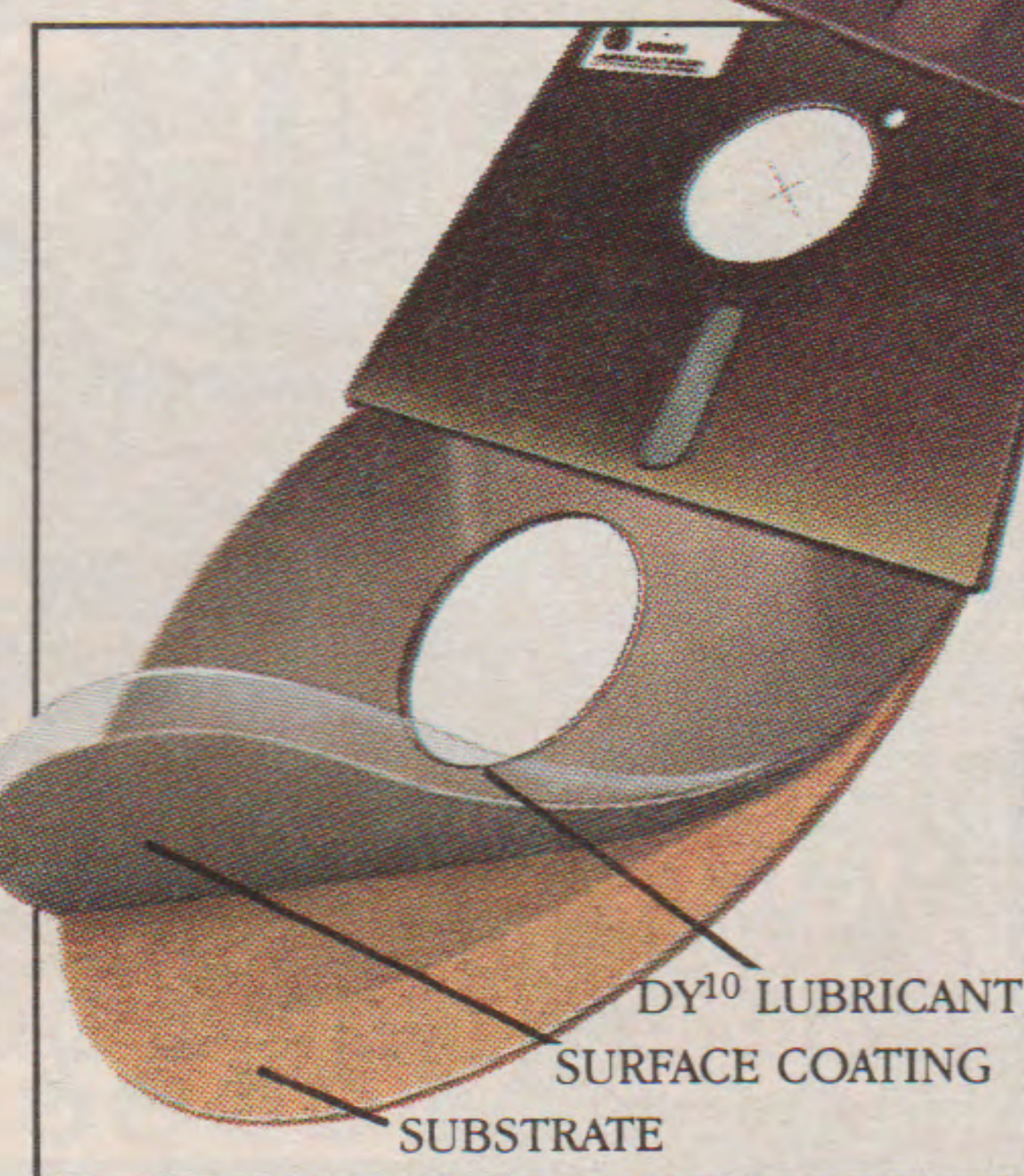
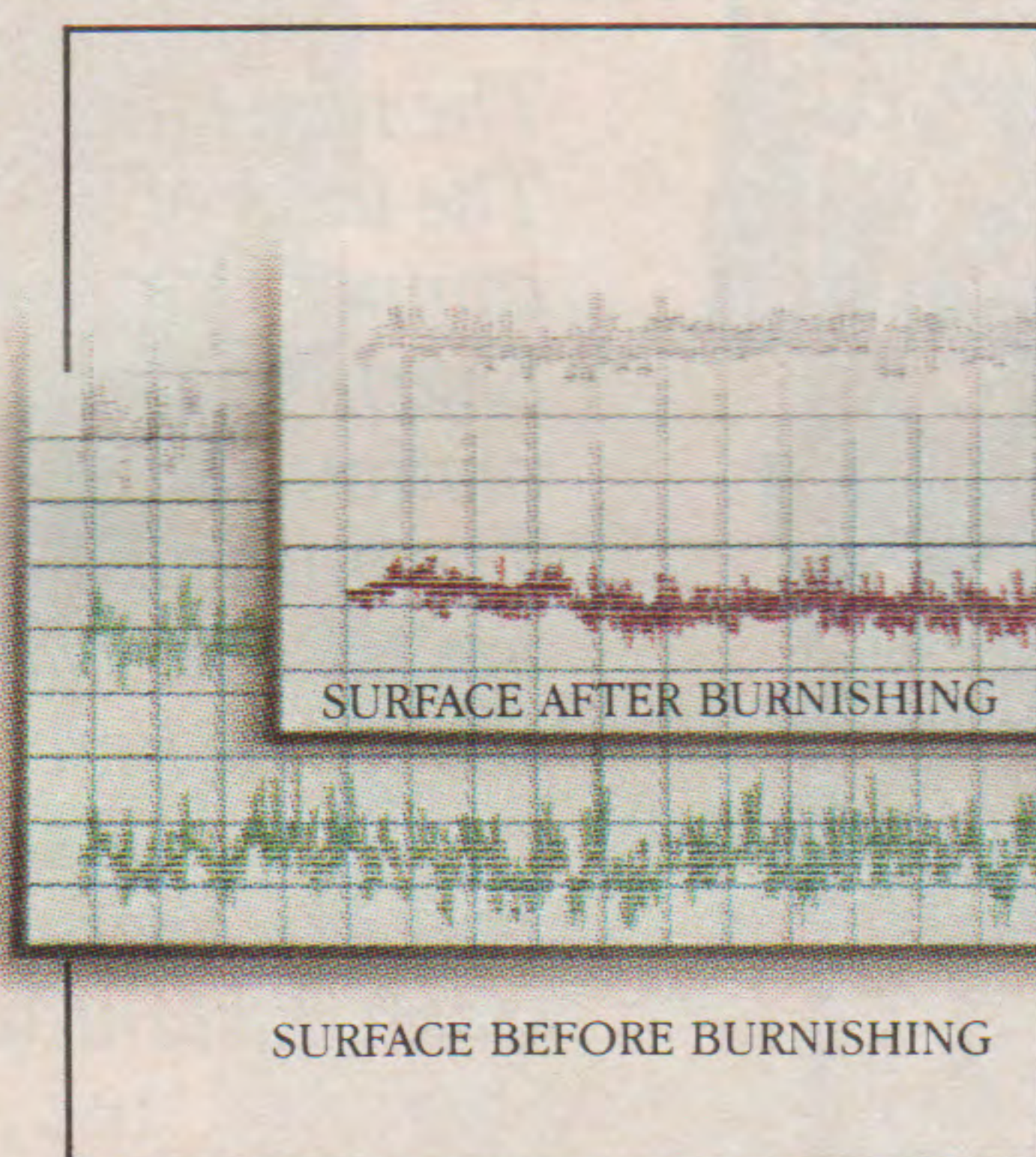
22-24, Washington, D.C. Sixth National Conference on Communications Technology in Education and Training, Shoreham Hotel. Policy, planning and management issues confronting educators and trainers using or exploring the possibilities of technology for instruction will be the main thrust of the conference. Sessions will emphasize practical considerations — choosing and acquiring equipment, selection and adequacy of courseware, organizational arrangement, instructor receptivity, training of instructional personnel, evaluation of results and articulation between schools, colleges and industry. Registration fee for the two and a half day conference is \$245. Sixth National Conference on Communications Technology in Education and Training, 111 Claybrook Drive, Silver Spring, MD 20902, (301) 593-8650.

March

8-10, Arlington Heights, Ill. The Role of the Microcomputer in Education IV, Arlington Park Hilton.

(continued on page 18)

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Only Dysan provides fully usable diskette surfaces that are truly 100% error-free across the entire face of the diskette. An exclusive on-and-between the track testing procedure guarantees error-free performance regardless of temperature and humidity distortions or slight head misalignments.

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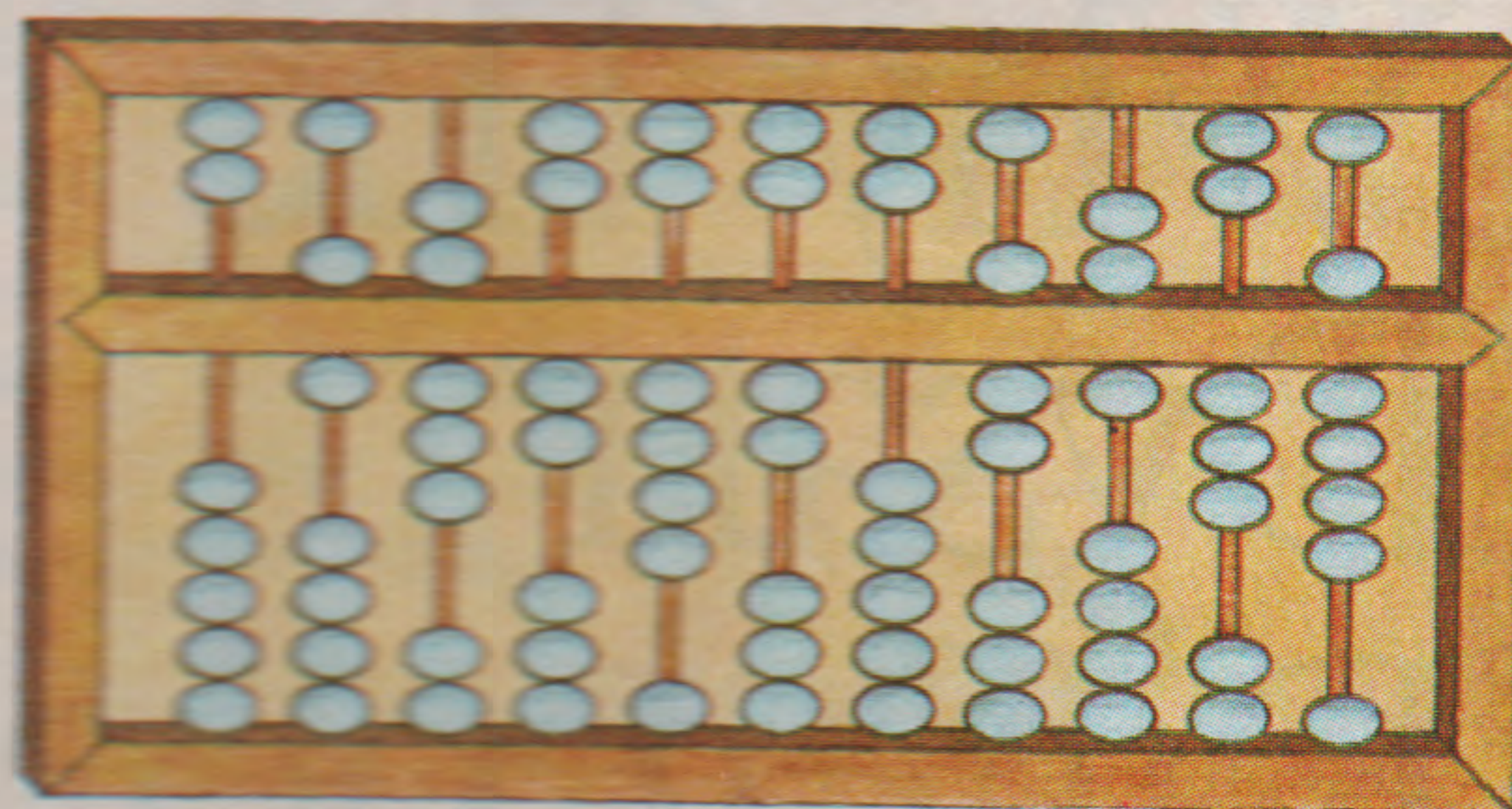
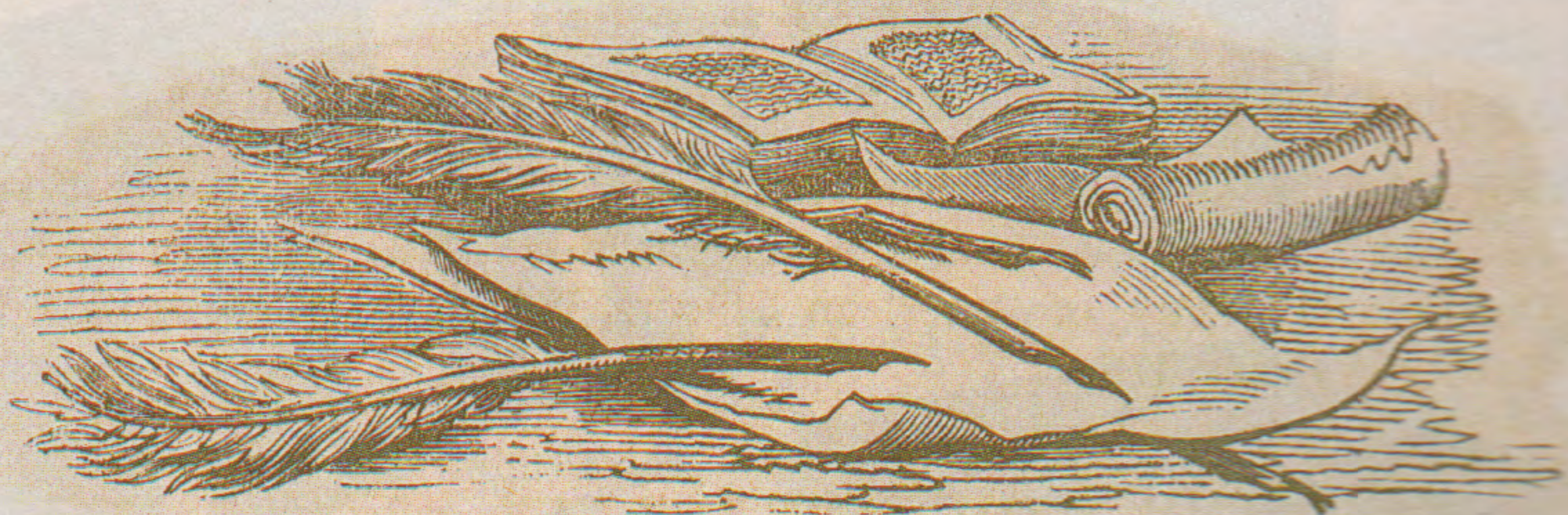
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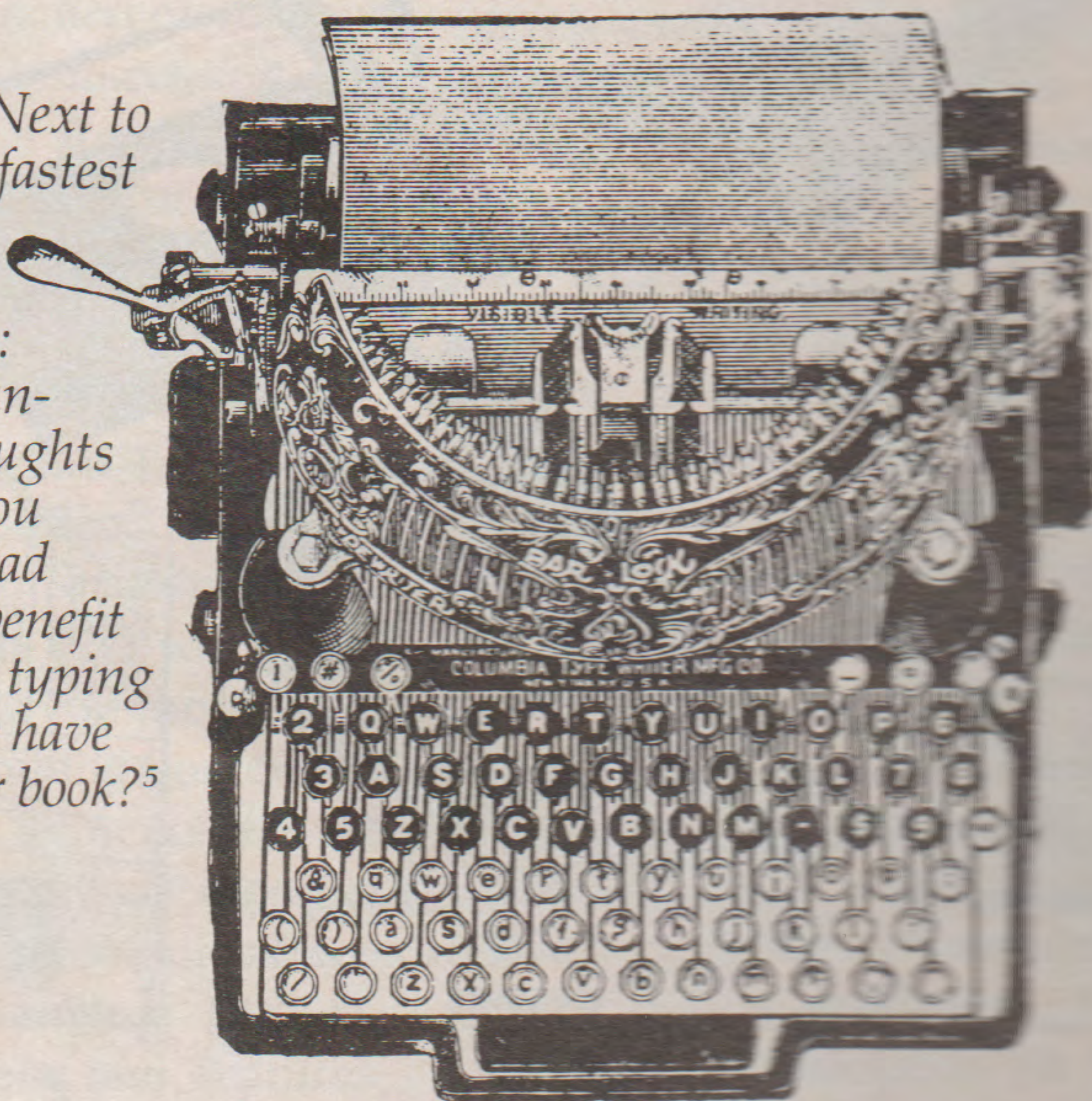
NOTES ON THE ORIGINS AND CAUSES OF

Paper. First century AD, China. Information becomes a more abundant resource. But now has paper itself become too abundant? The plague of the 20th century office: Clutter.¹



The abacus. Early hardware. Until recently it was, in the hands of a skilled operator, actually faster than a computer. Note: "Skilled operator."²

The keyboard. Next to shorthand, the fastest writing system known to man. Question: If you could transcribe your thoughts faster, would you think faster? Had Cervantes the benefit of even average typing skills, would he have written another book?³



The telephone. The ideal of communication: Sharing information quickly. The miracle isn't: "Mr. Watson, come here. I need you." It's that Mr. Watson came, instantly.⁴



The encyclopaedia. By definition, all current and essential information compiled and made accessible to the non-specialist. A fourteen-volume learning tool.⁵



¹It is to be noted, in general, that Digital Equipment Corporation's computer systems place particular stress on the elimination of many routine administrative chores involving paper, such as student registration, class scheduling, budget accounting.

²As recently as ten years ago it was the consensus that there would gradually come into being a sort of "computer priest class," who alone would consult these electronic oracles. Today, thanks to accessible systems—Digital's VAX, in particular—computer literacy is fast becoming accepted as a basic skill, like reading.

³An alternative to the postal system is developing between computer-connected parties: Electronic mail on the VAX system. VAX comput-

ers at different branch-campuses routinely exchange and transmit even lengthy written communications. Finding a stamp, a chronically irritating chore, becomes a thing of the past.

⁴Imagine a twist: What if Watson had been out? (Or his phone had been busy!) What if you wanted to ask a colleague in London a question. Would you call him at 1 A.M. his time? Or would you use a terminal to relay your question (via DECmail) to his terminal—guaranteed it would get to him?

⁵Cervantes was sometimes an inattentive writer. Had he the benefit of what any freshman can have today—a computer to "converse with"—his terminal might have flashed him "...Hoid it! Two pages ago you said that person's name was

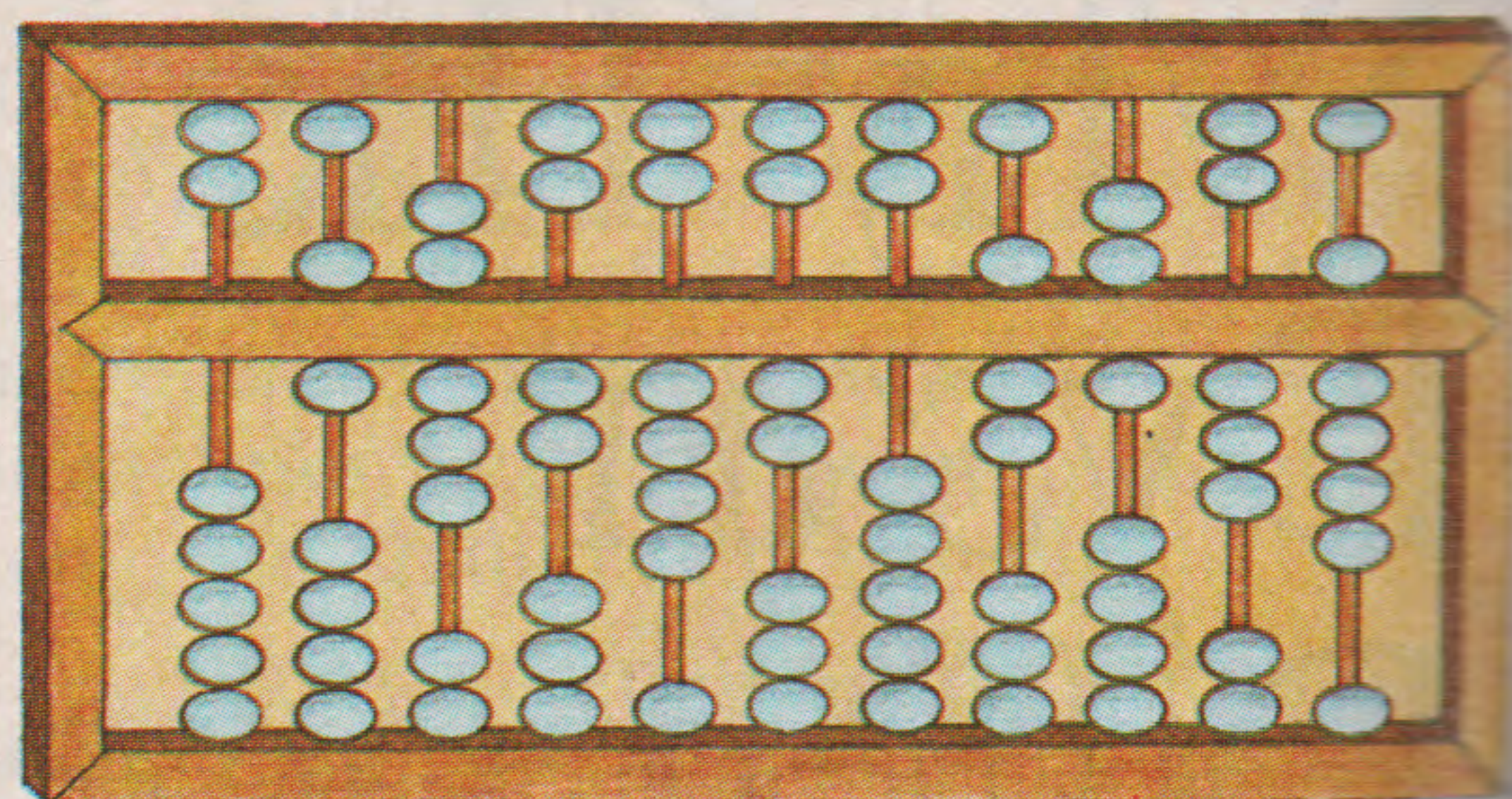
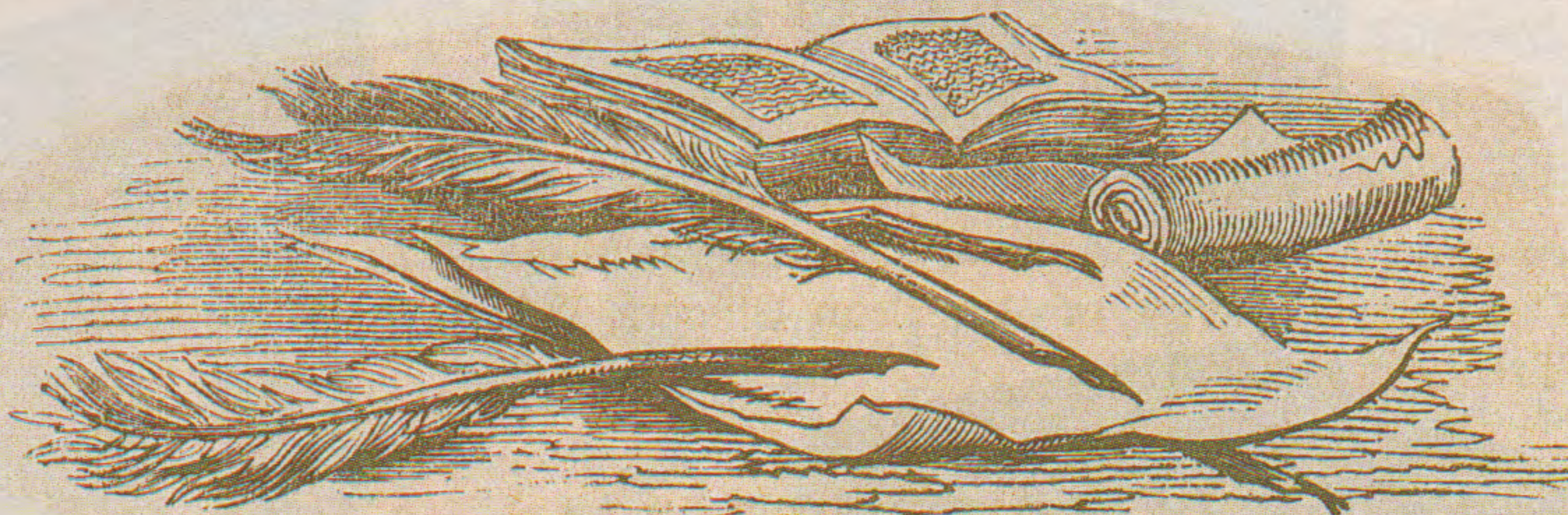
spelled..." On the vast potential of student time sharing, consider that with current VAX technology it is perfectly possible for a motivated student to sit down at a terminal for a minute between classes and simulate the moon's gravitational system.

⁶The encyclopaedia, if taken one more step, becomes computer-based education: An infinitely patient computer conducting a student through a simulated chemistry experiment step by step. Let him see the consequences of adding water to sulphuric acid. Obviously, this requires a computer terminal screen with exceptional graphics capability, like Digital's GRT terminal, and Courseware Authoring System.

⁷A telling comparison: To get out an annual

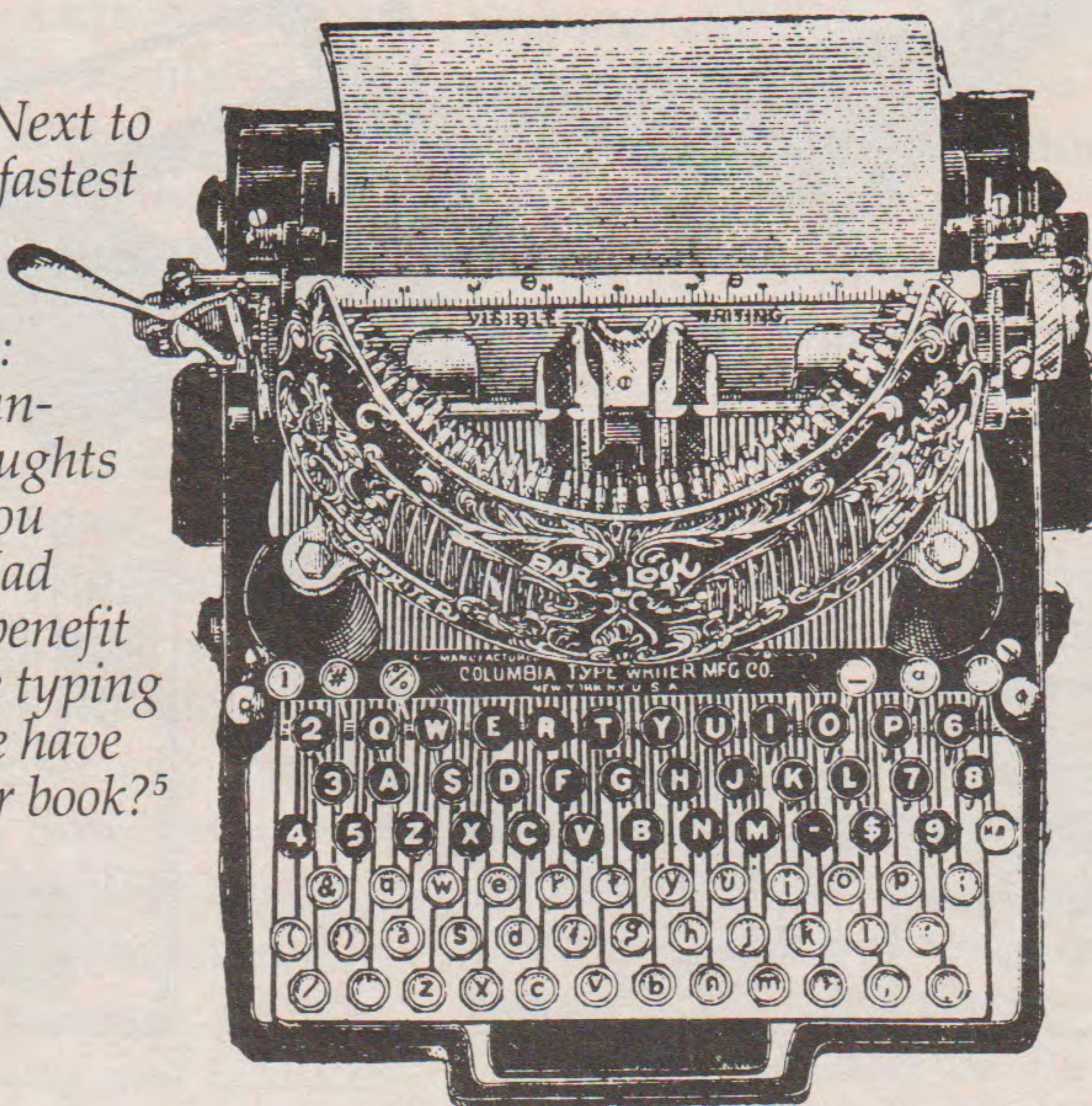
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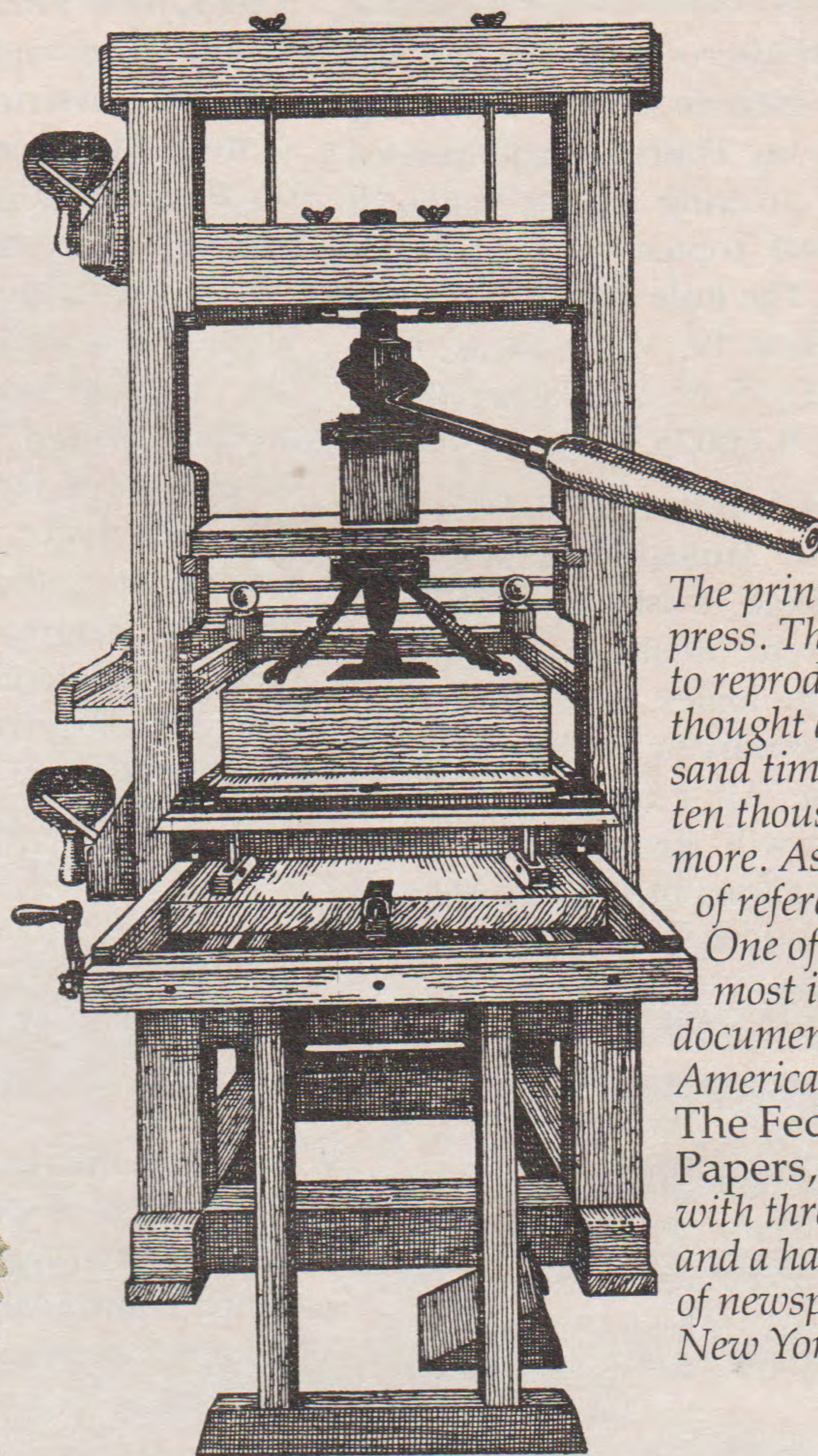
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USES OF THE COMPUTER REVOLUTION.

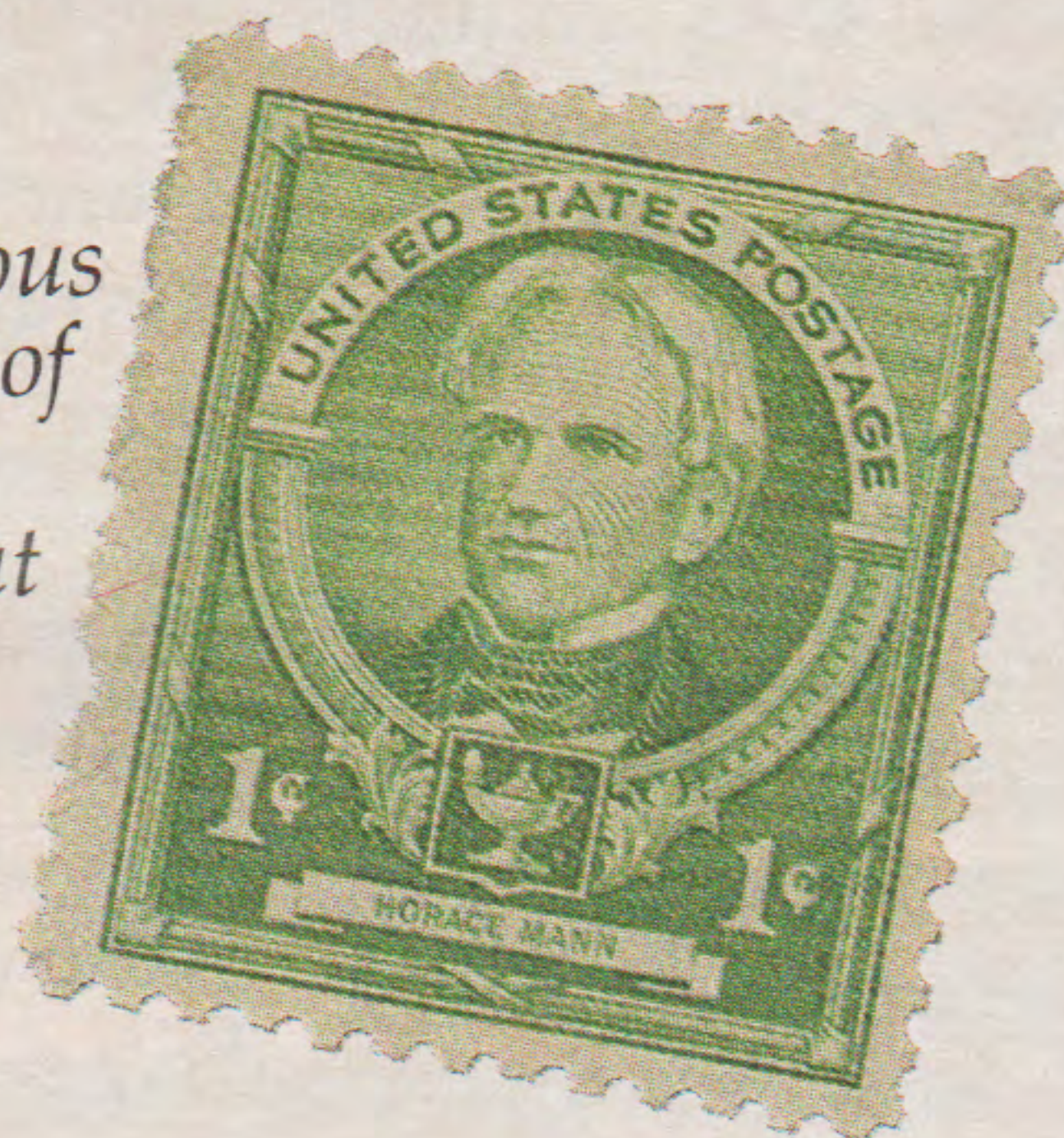


TV. Significant because many forms of information simply need pictures. Imagine you had to describe a Rubik's cube in writing. Or discuss the operation of the law of supply and demand on Australian wheat consumption in twenty-five words or less.⁸



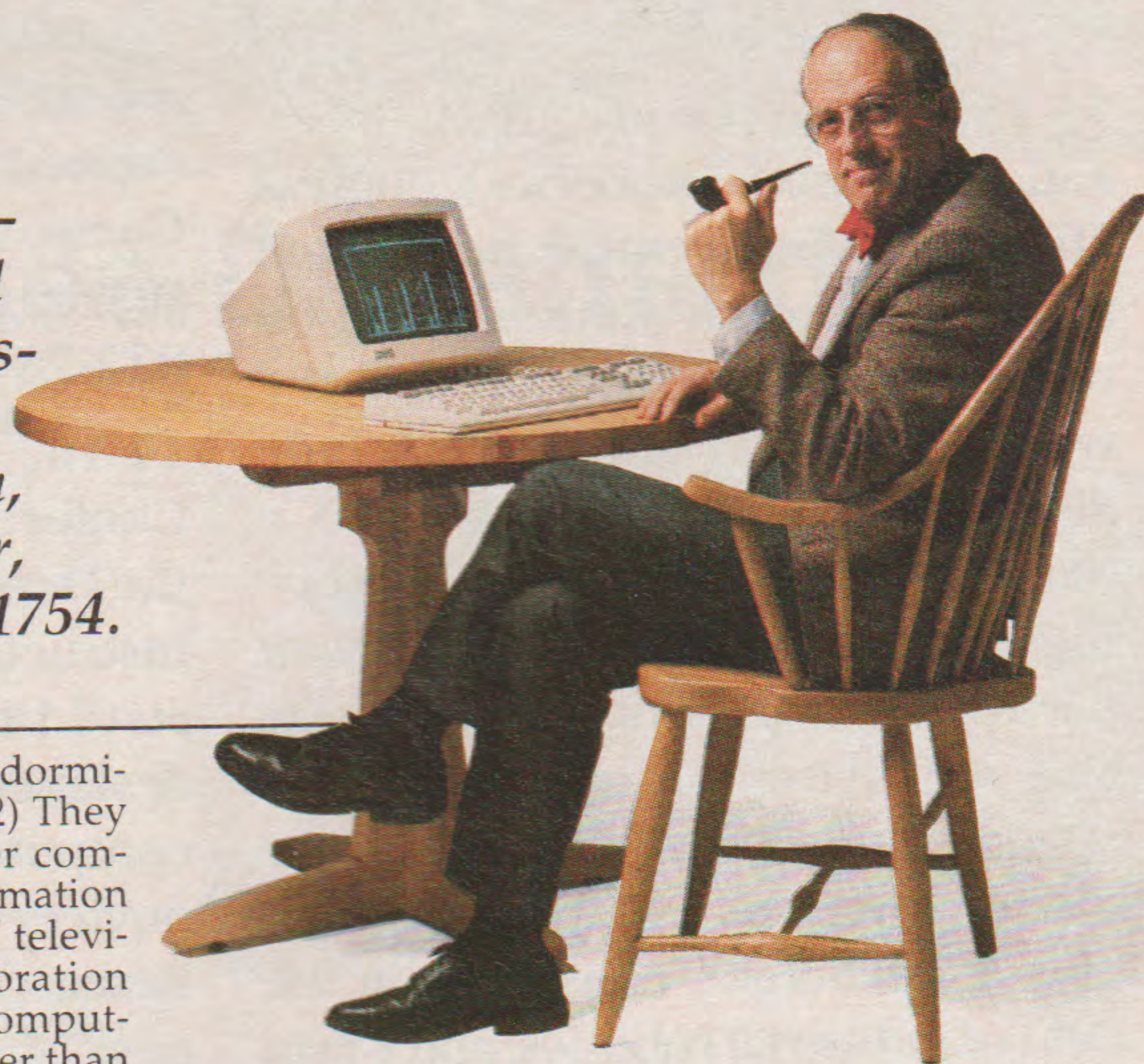
The printing press. The ability to reproduce a thought a thousand times. Then ten thousand more. As a point of reference: One of the most influential documents in American history, The Federalist Papers, began with three men and a handful of newspapers in New York state.⁷

The mail. The most ambitious system for the distribution of information in the world. Awesome in conception, but less than foolproof.³



Digital Equipment Corporation. Suppliers of educational computer systems, office information systems, word processors and personal computers, and software for students, faculty, administrators, office managers, and anybody who works with ideas.

For more information, write: Digital Equipment Corporation, Education Computer Systems Group, Media Response Manager, PK03-2/M94, 129 Parker St., Dept. TJ-01-84 Maynard, MA 01754.



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catalogue, it takes on the average a staff of working 40 hours a week for 20 weeks. There exists a text management system, DECset, which would accept data coming from the many various sources, fit it all together, adjust it all to sudden revisions, produce galleys ready for make-up, and finally, put them onto film. There are implications here for the academic press, in that DECset may make the publishing of special works economically feasible.

Significant also as a personal and portable source of information. A \$60 window on the world that can be set up on anybody's kitchen table, television is a very close ancestor of the modern personal computer. This comparison may be developed: 1) Like TV, personal computers are to

be found in student unions, dining halls, dormitories, sororities—no longer just in labs; 2) They can be linked to each other and to other computer systems on campus to share information among them, forming a kind of 'two way' television network. Digital Equipment Corporation has, incidentally, carried this ability of computers to communicate with each other farther than has any other company. At this writing, there are no serious rivals to its DECnet networking approach which allows personal computers, word processors, terminals, VAXs, and DECsystems to share information.

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Calendar (continued)

March

Hosted by Micro-Ideas, the convention will include in-depth day-long seminars on Thursday and several sessions covering a wide range of educational topics on Friday and Saturday. The Role of the Computer in Education IV, Micro-Ideas, Rick Nelson, 1335 N. Waukegan Road, Glenview, IL 60025, (312) 998-5065.

19-22, Washington, D.C. FOSE '84, the Eighth Annual Federal Office Systems Expo, Washington Convention Center. "Realities of Integration: Technologies, Applications and Human Resources" is the theme of FOSE '84. An expected 36,000 attendees will participate in conference sessions and visit displays of software microcomputers, storage technology, computer graphics, stand-alone units and completely integrated systems. Some 1,200 exhibit booths are expected to be filled. Contact: Jacqueline Voigt, National Trade Production, 9418 Annapolis Road, Lanham, MD 20706, (301) 459-8383, or (800) 638-8510.

April

13-15, Albuquerque, N.M. International Personal Robotics Congress (IPRC). This convention is expected to draw between 3,000 and 5,000 robot enthusiasts from around the world. The Congress will include displays, exhibits, seminars and a number of cultural events portraying the history and mythology of personal robots. Robot enthusiasts also will have the opportunity to display their creations and enter them in various competitions. Joseph Engleberger, consultant in the field of industrial robotics, and David Heiserman, author and researcher in the field of artificial intelligence and personal robotics, are among

those scheduled to conduct seminars at the Congress. IPRC, 1547 S. Owens St., No. 46, Lakewood, CO 80226, (303) 278-0662.

13-15, New York City, N.Y. Microcomputers and Basic Skills in College, Instructional Resource Center. The Center invites papers on the use of microcomputers in postsecondary basic skills instruction in the following areas: writing, English as a second language, reading, speech, mathematics (arithmetic through precalculus) and other areas of developmental education. Abstracts should be typed, single-spaced and no more than one page in length. They should be received before January 15. Contact: Prof. Geoffrey Akst, Instructional Resource Center, the City University of New York, 535 E. 80th St., New York, NY 10021, (212) 794-5425.

May

7-11, Washington, D.C. Annual Convention of the Association for Educational Data Systems (AEDS). Planned topics for the convention include: education administration, instruction (CAI/CMI), computer literacy for students and teachers, computer science, hardware innovation, software development and evaluation, student records management, computers and the handicapped, and more. Contact: Linda Corso, AEDS, 1201 16th St., N.W., Washington, D.C. 20036, (202) 822-7845.

14-16, Columbus, Ohio. Annual Conference of the Association for the Development of Computer-Based Instructional Systems (ADCIS), Ohio State University. The conference is designed for anyone interested in computer-based instruction — from novices to long-time researchers. Researchers who have developed new systems for computer-based instruction will present their findings at the conference, and demonstrations of hardware, soft-

ware and courseware also will be given. Ohio State University Communications Services, 4th Floor Fawcett Center, 2400 Olentangy River Road, Columbus, OH 43210, (614) 442-2711.

16-18, Miami, Fla. Teaching Math with Microcomputers, Miami Marriott Hotel. This is one of a series of microcomputer seminars conducted in various cities across the country by the National Council of Teachers of Mathematics. An intensive two-day program, it is designed to introduce microcomputers to teachers and supervisors of mathematics education at the elementary, intermediate and secondary school levels. NCTM Seminar Series, 1906 Association Drive, Reston, VA 22091, (703) 620-9840.

June

4-8, San Francisco, Calif. 1984 Society for Information Display (SID) International Symposium, San Francisco Hilton. A global forum devoted to all aspects of information display, the symposium will include areas of interest such as: flat-panel displays (emissive and passive); display addressing/packaging; CRT display; large-area displays; hard copy/display storage systems; human factors, and display systems and applications. Also part of the symposium will be seminars, exhibits, evening panel discussions and author interviews. Contact: Leonard Klein, Symposium Manager, Palisades Institute for Research Services, Inc., 201 Varick St., New York, NY 10014, (212) 620-3388.

6-8, Montreal, Can. ACM SIGCOMM '84 Symposium on Communications Architectures and Protocols. Contact: General Chairman Michael J. Jefguson, INRS-Telecommunications, 3 Place du Commerce, Verdun, Quebec H3E 1H6, Canada, (514) 761-5831.

(continued on page 20)



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Calendar (continued)

June

12-15, Dayton, Ohio. National Educational Computing Conference, Dayton Convention and Exhibition Center. Topics covered in the

conference will include: computer science, engineering and information systems education; computer usage in the physical sciences, social sciences and humanities; state and federal programs related to computers in education; computers in educational research; administrative data processing; computer-service courses and facilities, and more.



This is no longer the only way to generate tests.

We are pleased to announce that the days of manual Test Item Management are finished. **microTIM** is a personal computer-based Test Item Management System, the only one with the power and flexibility to provide large computer features with small computer friendliness and cost.

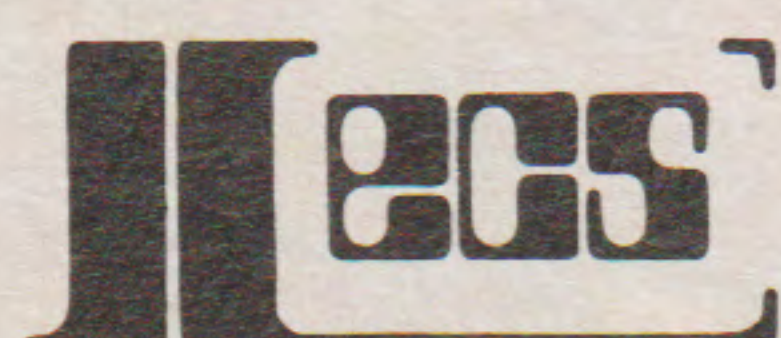
microTIM has been designed for the user with little or no experience with the world of computers. Simple word-processing skills are all that is needed to enter, modify and fully manipulate test items. Then assemble and print tests created from questions recalled from a large selection of test item characteristics.

microTIM is also security conscious. Students with proper passwords can be granted selective access to test questions for interactive self-examination.

microTIM will operate on machines with MS-DOS and CP/M operating systems, which include the IBM Personal Computer, Apple and dozens of other personal computers.

microTIM is a proven system, currently managing test item banks containing thousands of questions.

Call or write today. Those days of cut-and-paste test assembly are finally over.



**JL EDUCATIONAL
AND COMPUTER SERVICES**

PO Box 35142 Dallas, TX 75235
(214) 351-1283

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IBM Personal Computer is a trademark of IBM Corporation
CP/M is a trademark of Digital Research Corporation
Apple is a trademark of Apple Computer, Incorporated

Write No. 35 on Inquiry Card

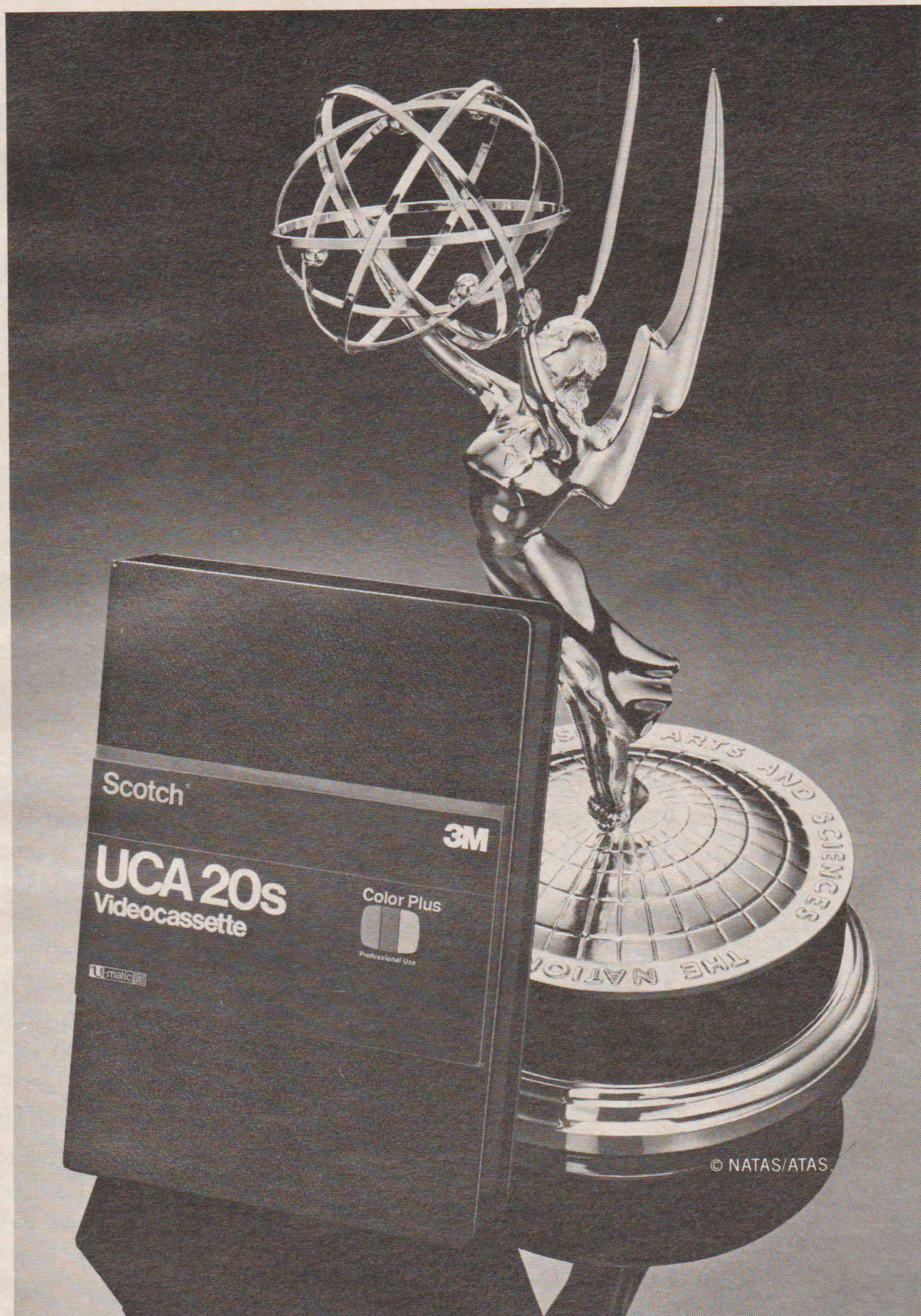
The fifth conference of NECC, NECC '84 will stress the practical nature of computer use. It is a cooperative venture of 19 organizations.

20-22, Kissimmee, Fla. The Fourteenth International Conference on Fault-Tolerant Computing, Hyatt Orlando Hotel. Sponsored by the IEEE Computer Society's Technical Committee on Fault-Tolerant Computing, the conference will cover such subject areas as: fault-tolerant computer system/network/switching/distribution systems; hardware fault-tolerant design/methodology; dependable software development; topics in testing and testability; modeling, evaluation, simulation, verification and measurements, and new concepts and merging disciplines. Contact: Richard Sedmak, Sperry Corp., P.O. Box 500, M.S. C1-SW12, Blue Bell, PA 19424, (215) 542-3638.

July

9-12, Las Vegas, Nev. 1984 National Computer Conference, Las Vegas Convention Center. The theme of the 12th annual conference is "Enhancing Creativity." Russell Brown, nationally known financial and management consultant, will serve as conference chairman. A main theme of the conference will be the trend toward personalization of computing resources and the broad impact it is having on individual productivity. The conference is sponsored by the American Federation of Information Processing Societies, Inc., the Association for Computing Machinery, the Data Processing Management Assoc., the IEEE Computer Society, and the Society for Computer Simulation. American Federation of Information Processing Societies, 1815 N. Lynn St., Arlington, VA 22209, (703) 558-3613.

WE GAVE THE WORLD VIDEOTAPE. NOW THE WORLD HAS GIVEN US AN EMMY.



In 1956, we pioneered the development of videotape.
In the years since, we've refined, redesigned, perfected it.
This year, for our performance over all those years, Scotch[®]
videotape has been given an Emmy. It is an award unprecedented
in the history of the industry. It is gratefully accepted.

THE WORLD WATCHES SCOTCH[®]

VIDEOCASSETTES

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The Emmy is presented by the National Academy of Television Arts and Sciences.

3M

News

Software Licensing Plan Available

Bertamax Inc., recently announced its Educational Software Licensing Plan for public and private schools that have more than one brand of microcomputer in their buildings and cannot afford to purchase a version of a program for each machine.

Schools wishing to participate in the cost-sharing plan can do so by joining together to form a consortium of 50 or more members. One school is named the Consortium Host. The host receives a master set of some 250 program disks and accompanying teacher's manuals. The host will be licensed to reproduce an unlimited number of copies of the program disks and manuals for use by its member schools.

The programs included under the license plan will run on Apple, Atari, Commodore 64, IBM PC, TRS-80 Color, and TRS-80 Model III microcomputers. The license plan covers nearly all the instructional programs Bertamax has produced. The programs designed for teachers, counselors and administrators are not included in the plan.

The annual membership fee per school is \$250. The first-year start-up license fee is \$500. The additional \$250 is charged to cover the initial cost of setting up the program the first year. Member schools will automatically receive updates and new releases as they become available at no additional cost, as a benefit of remaining members. A number of new programs are being developed for future release to plan members, some including synthesized speech.

Schools wishing to participate in the plan should contact Bertamax, Inc., for the names of schools near them who also wish to participate

in a consortium. A second option for schools to pursue is to contact schools they wish to work with in such a consortium and have the host school contact Bertamax for a license.

There is no limit to the number of schools that can belong to a consortium. However, the minimum number of schools required to form a consortium is 50.

Write No. 414 on Inquiry Card

Software Co. Offers Educational Grants

Wisconsin Microware, an agricultural software company, has announced educational grants totaling over \$1 million available to secondary and vo-tech schools that purchase its product, AG/PAC. The purpose of the grants is to help further computer education and application in agriculture, according to company spokesmen.

AG/PAC consists of 80 user-friendly agricultural software programs packaged in 32 modules. The package covers cash crop, livestock production, and financial and real estate management. It runs on the Apple II+, IIe and the IBM PC computers.

Educational grant inquiries should be directed to: Christopher A. Houden, Ex. Vice President, 5201 Old Middleton Road, Madison, WI 53705.

Write No. 411 on Inquiry Card

NUC Expands to International Organization

The National University Consortium, this country's first national distance education organization, has opened membership to English-speaking institutions and cultural organizations worldwide, becoming the International University Consortium for Telecommunications in Learning.

IUC (formerly NUC) came into being when the Consortium's

Board of Directors changed the organization's name and by-laws. Two Canadian institutions of higher education are the first non-U.S. members of the reconstituted consortium. Athabasca University, Edmonton, Alberta, and the Open Learning Institute (OLI) in Vancouver, British Columbia, both distance learning institutions, are expected to play active roles as consortium members.

Having started three years ago with seven university members, the consortium now has 20 university and college members and 21 affiliated broadcasting systems in the U.S. and Canada.

The consortium is continuing to grow in accordance with the plan developed more than four years ago. Student enrollments have also continued to grow accordingly with over 4,000 adult students having successfully completed IUC courses through their local institutions.

Write No. 413 on Inquiry Card

Texas Librarians Sponsor A/V Competition

The deadline for entry into the Audio-Visual Production Awards contest sponsored by the Texas Association of School Librarians is February 1. Students, teachers, school librarians, and media specialists from the public, private and parochial schools of Texas are invited to enter this competition.

Awards will be given to those educators and students who have created outstanding audio/visual projects for educational use. The criteria for judging include: originality/creativity, technical quality, organization, choice of most effective media, and relevancy to stated purpose.

Award-winning entries will be presented at the Texas Library Association Convention to be held in Corpus Christi in April of this year.

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Award-winning entries will be presented at the Texas Library Association Convention to be held in Corpus Christi in April of this year.

For more information, send a self-addressed stamped envelope to: Ann Ruth Reed, Production Award Committee Chairman, Royal High School Library, Box 247, Brookshire, TX 77423.

Write No. 412 on Inquiry Card

Network Connects VAX Systems at RIT

Rochester (N.Y.) Institute of Technology (RIT) will become one of the first schools in the nation to experiment with an ETHERNET personal computer network from Digital Equipment Corp., according to Dr. Robert Golden, head of RIT's Personal Computer Task Force.

Phase one of the ETHERNET network will connect four VAX 780 systems in RIT's computer building and a VAX 782 system in the Institute's College of Engineering. Future phases of the experiment will connect personal computers and terminals being used by the staff of RIT's Information Systems and Computing (ISC), personal computers of faculty and staff in the colleges of Engineering and Science, and the UNIX system in the School of Computer Science and Technology.

The initial phase of ETHERNET will enhance the communication link between the VAX 780 systems and integrate the VAX 782 system in the College of Engineering into the network. It also will provide a base on which future phases can be developed and assessed.

These planned phases will permit institute personnel to become familiar with the use of computer network resources, including the use of personal computers, singly or in clusters, and network software systems, such as word processing and electronic mail.

"All the equipment for phase one of the network has been ordered and it is scheduled to be in operation by early 1984," said Golden. "I want to emphasize that RIT is going ahead

with the project on a phase by phase basis and can back out at any time. At each phase the project has to demonstrate its educational value to the institute before we proceed to the next phase," he said.

Write No. 439 on Inquiry Card

Software Contest Aimed at Educators

EduWare Services, Inc., is sponsoring a contest in which teachers at all levels are invited to submit ideas for student programs. The grand prize for the contest is \$5,000, and a luxury trip to the spring COMDEX trade show in Atlanta to receive the prize.

Entries for the contest will be judged on the following criteria: instructional validity, quality of material, creativity and originality, marketability, and practicality. Many of the ideas generated by contest participants may be developed into computer programs for classroom and home education. The best 39 entries will be prize winners.

The contest panel will be made up of judges who are leaders in their fields, according to an EduWare spokesman. Fifty finalists will be chosen by EduWare; then the panel of judges will choose the prize winners.

The panel of judges includes: Sherwin Steffin, founder of EduWare Services, Inc.; Dr. Sylvia Charp, editor-in-chief, T.H.E. Journal; Mary Dalheim, editor, Teaching and Computers Magazine; James Gates, executive director, National Council of Teachers of Mathematics; Dr. Gaylen Kelley, professor of education, Boston University School of Education; and Alvin Kent, director, Media Resources Center, Iowa State University.

In addition to the grand prize, 38 other prizes will be awarded in first, second and third place categories. Three individuals will win first prize awards of two Franklin Ace computers with Epson printers — one for each winner's home and another

for the school each winner represents.

The second prize award, which will go to 15 winners, is a library of Peachtree's educational software by EduWare. The third prize award, which will go to 20 winners, is an EduWare educational software package of choice.

Write No. 407 on Inquiry Card

Study Evaluates Use of Videodisks

The International University Consortium for Telecommunications in Learning (IUC) has released the findings of the 1983 Videodisk Feasibility Study, conducted in cooperation with Pioneer Video, Inc.

The study evaluated videodisk technology as a cost-effective alternative distribution system for the video components of IUC courses. According to IUC spokesmen, the evaluation showed videodisk technology is feasible as an alternative means of program distribution as well as being a valuable teaching aid for faculty.

Eight organizations participated in the study — six IUC member institutions, one broadcasting station and the Defense Activity for Non-Traditional Education Support (DANTES). Learning centers were created at hospitals, libraries, military bases and corporations. Each participant received videodisk copies of the program series "Exploring Language: Thinking, Writing, Communicating," produced by the consortium.

The programs were divided into content segments and a series of questions for each segment was developed. This enabled participants to use the rapid access capability of videodisk to retrieve selected segments of the programs for review and discussion.

The quality and practicality of videodisk technology as demonstrated in the feasibility study could reduce a number of costs currently incurred

(continued on page 24)

News (continued)

by broadcasting, cable and institutional members. The study showed duplication and broadcasting costs are reduced with the use of videodisk as a distribution system. It also showed that when produced in quantity, the videodisk is less expensive than a videocassette.

Write No. 437 on Inquiry Card

Schools Buy Micros With Grant Money

Using funds made available through federal government Chapter II grants, public and non-public elementary and high schools throughout the United States added to their microcomputer hardware/software inventories during the 1982-83 school year.

In New York state, 735 school districts used 65 percent of their Chapter II funds to acquire microcomputer equipment, while in Idaho, 36.5 percent was used for the same purpose by 114 public school districts and 31 non-public school districts.

The 254 public and 63 non-public school districts of Kansas budgeted 46.6 percent of their Chapter II grants for computer equipment, while in North Carolina, 28 percent was used by that state's 236 school districts.

Elementary and secondary schools in Delaware similarly budgeted 23 percent of their Chapter II funds for computers; schools in both Maine and Massachusetts allocated 25 percent; New Mexico, 30 percent; Ohio, 38.8 percent; Oregon, 24 percent; Tennessee, seven percent; Vermont, 20 percent; and Virginia, 25 percent.

Data released by the International Communications Industries Assoc. also reveals that in Illinois, 650 of the state's 2,385 school districts purchased computers with Chapter II funds during the 1982-83 school year.

Where actual dollar figures were

included in the report, Arizona's 220 districts invested \$3.1 million of Chapter II funds in instructional supplies and equipment, primarily microcomputers. In Louisiana, 73 districts allocated \$1.8 million; Minnesota's 830 districts used \$1.3 million; in Missouri, just under \$2 million was used by 1,030 districts; \$96,000 was invested by 17 school districts in Nevada; 161 districts in New Hampshire utilized \$1.3 million; Pennsylvania's 529 districts spent \$4.3 million; and in Rhode Island, 40 districts budgeted \$285,000.

According to TALMIS, a consulting service based in Oak Park, Ill., Chapter II funds comprised only 22.2 percent of the actual expenditures by each district for computers. The service estimates that 57.6 percent of the elementary and secondary microcomputer budget comes from district funds.

Write No. 405 on Inquiry Card

Post Cereals, Atari Launch Computer Literacy Program

Post Cereals and Atari, Inc., recently joined force in a year-long national program, "Catch on to Computers." The two-part program consists of a redemption offer and a series of computer literacy festivals.

Through the redemption program, schools and any group affiliated with a school can receive free Atari hardware and software in exchange for Fun 'n Fitness proof-of-purchase seals from any Post Cereal box.

To obtain the free equipment, schools must collect a specific number of points for each item, which range from home computers to printers, cassette and disk drive units, expansion devices and educational software.

The redemption program is open to all schools, public, private and parochial. Orders will be accepted only between April 1 and June 30, 1984.

Write No. 421 on Inquiry Card

Scottish University Sets Up Program for Videotaped Courses

Heriot-Watt University of Scotland is establishing a program to provide videotaped engineering courses from universities throughout the world to students in England.

The university has signed agreements with the Massachusetts Institute of Technology and the Association of Media-Based Continuing Education for Engineers, Inc., of Atlanta, which gives it access to 400 videotaped engineering courses from 21 U.S. universities.

Heriot-Watt also will assist in coordinating video courses produced in Britain. Eventually it plans to create an international exchange system for video courses.

According to K.D. Stephen, director of television at Heriot-Watt, more than 35,000 engineers worldwide take post-graduate video courses annually to keep pace with new developments.

"Even the best universities in the United States find it useful or necessary to draw on videotaped courses from other universities," Stephens said. "In high technology, we're moving toward a university of the world linked by research papers, conferences and video courses."

Write No. 403 on Inquiry Card

Publisher Invites Books from Teachers

Arco Publishing, Inc., a division of Prentice-Hall, has announced it is looking for teachers in all disciplines to write books on various aspects of computers and computing.

The prime audience Arco is trying to reach is the secondary school student and the main interest of the publishing house is applications. Software is also a possible subject area.

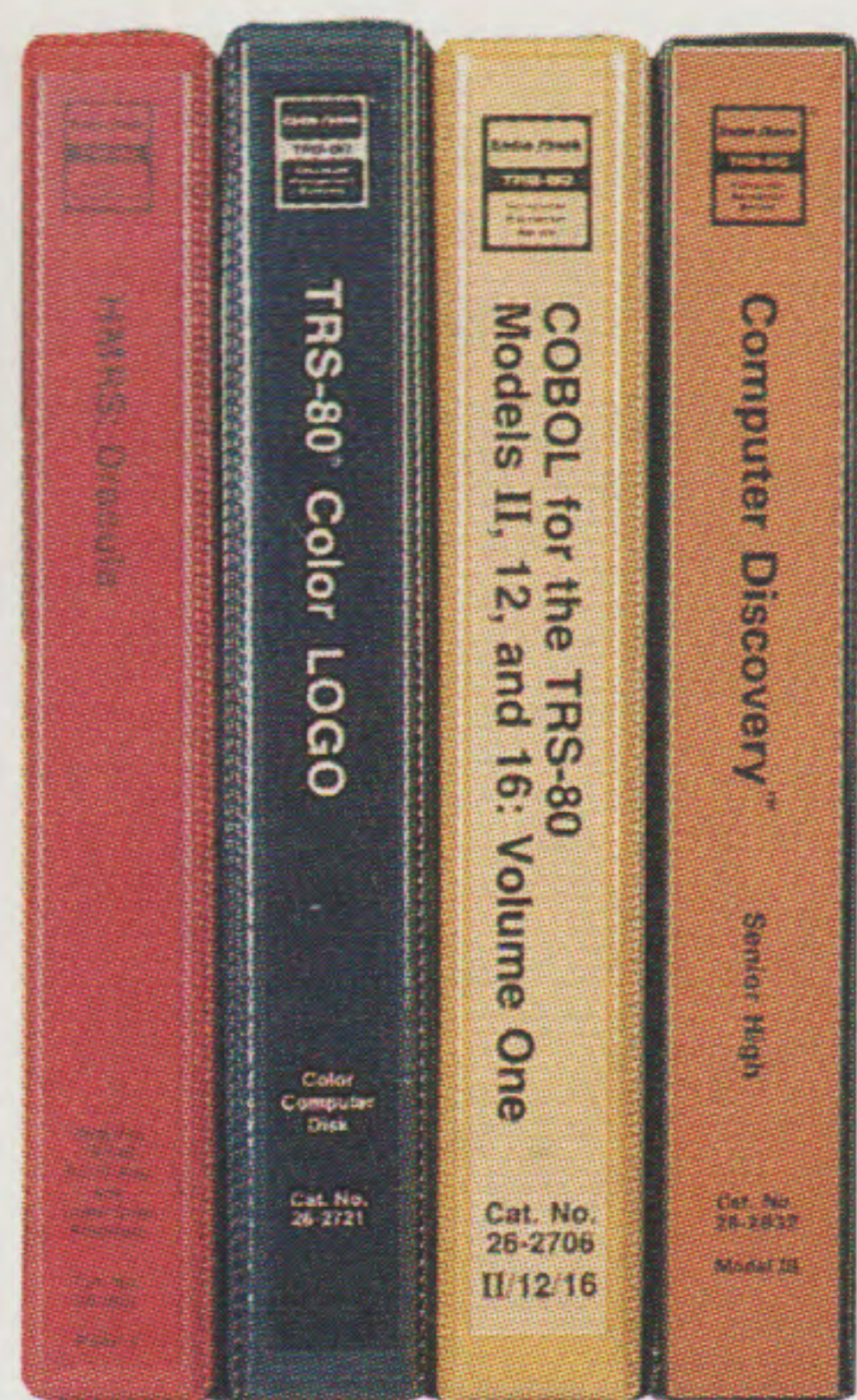
To receive guidelines, those inter-

(continued on page 31)

Write No. 104 on Inquiry Card

Radio Shack® Educational Software Catalog 1984





Radio Shack's Commitment to Education

We Meet Your Total Classroom Computing Needs

Radio Shack's TRS-80® microcomputer is a valuable teaching tool widely used in schools nationwide. We have a major commitment to support educational uses of the TRS-80 by producing a growing line of instructionally-sound courseware. We provide training and support, including free computer training classes, courseware manuals designed for educators who have never worked with a computer, and Regional Educational Coordinators.

A Wide Selection of Field-Tested Programs

Radio Shack involves the experts—teachers, curriculum developers and administrators—in designing and field-testing our complete line of TRS-80 courseware. Compare our courseware with other programs currently available. You'll see what a difference a commitment to quality can make.

TRS-80 Reading Courseware for Your Classroom



Children's Computer Workshop Educational Packages

These superb courseware packages were designed by Children's Computer Workshop. CCW is an activity of Children's Television Workshop—the creator of Sesame Street®. The packages are for use with first and second graders and require a TRS-80 Color Computer disk system. Each package includes diskettes, teacher's guide, game boards, posters, spirit masters and activity cards.

Play-With-Language™ (Cat. No. 26-2538, \$99) consists of three word reading activities that combine graphics and text to teach sight and vocabulary words, decoding skills, and comprehension skills. **Hands On** (Cat. No. 26-2639, \$99) encourages self-expression with the computer. The first activity lets students write with beginning word processing aids. The second activity, children create and manipulate pictures in ways unique to computer art.

Computer Assisted Reading Development

C.A.R.D. I: Sentences and **C.A.R.D. II: Paragraphs** are adapted from the successful Philadelphia Computer Assisted Reading Development Program. They are written at a 4 to 8-grade level for students with reading problems. TRS-80 AUTHOR I Lesson Presentation Package (26-2707) or TRS-80 AUTHOR I (26-1727) and a Model III or Model 4 disk system are required. Network 3 compatible using the TRS-80 Network 3 AUTHOR I Lesson Presentation Package (26-2713).

C.A.R.D. I: Sentences (*26-2603, \$199) covers sentence recognition, relationships, ordering, and labeling. Pre- and post-tests included for each topic.

C.A.R.D. II: Paragraphs (*26-2604, \$199) provides reading development lessons to increase comprehension skills. The lessons help students define sentence relationships within a paragraph through recognition of general and specific topics, details and topic sentences. Pre- and post-tests included.



Reading Series

The programs in our **High Motivation Reading Series** are written for grade levels 4-6 and are accompanied by four student readers and a read-along audio tape. Comprehensive spelling and vocabulary exercises included. HMRS programs require a Model III or Model 4 disk system and TRS-80 MicroPILOT™ (26-2718).

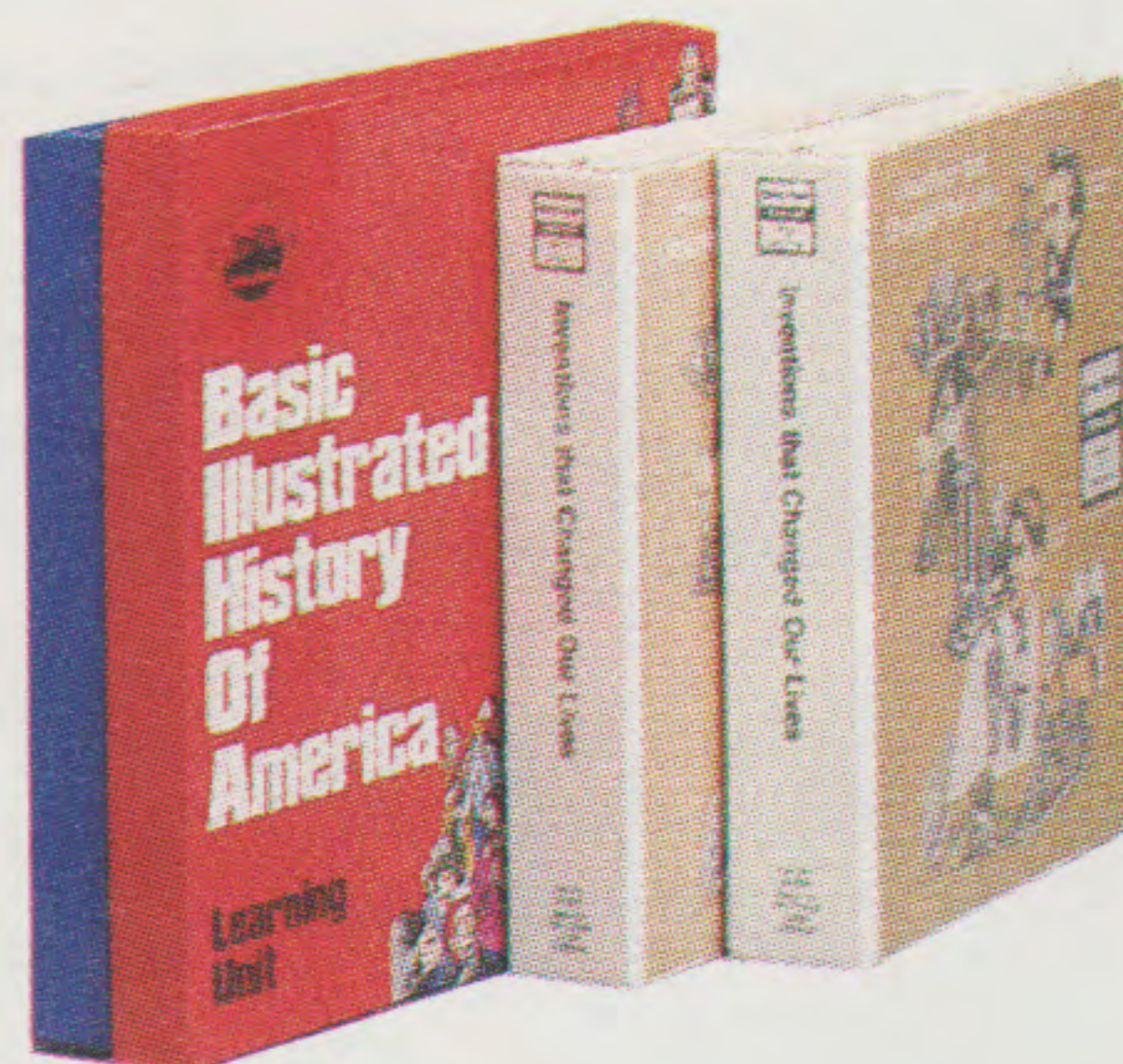


Select **Charles Lindbergh/Amelia Earhart** (*26-2513, \$74.95), **The Hound of the Baskervilles** (*26-2514, \$69.95), **Dracula** (*26-2515, \$69.95), **Moby Dick** (*26-2516, \$69.95), **The Beatles** (*26-2517, \$69.95), **20,000 Leagues Under the Sea** (*26-2518, \$69.95), **Time Machine** (*26-2519, \$59.95), **Frankenstein** (*26-2520, \$59.95), and **HMRS Student Records System** (26-2521, \$29.95).

Introduction to the Alphabet (*26-1718, \$39.95) helps 4-6 year-olds learn the alphabet and computer keyboard. Available on cassette or disk for Model III or 4.

Enlighten Your Students With Our History Packages

Radio Shack's **Basic Illustrated History of America Learning Unit** (26-2645, \$299) includes twelve illustrated books on American history—from 1500 to the 1980's. Read-along audio tapes and computer activities diskettes are included. TRS-80 AUTHOR I Lesson Presentation Package (26-2707) or TRS-80 AUTHOR I (26-1727), and a Model III or 4 disk system required. Network 3 compatible using 26-2713 (page 5).

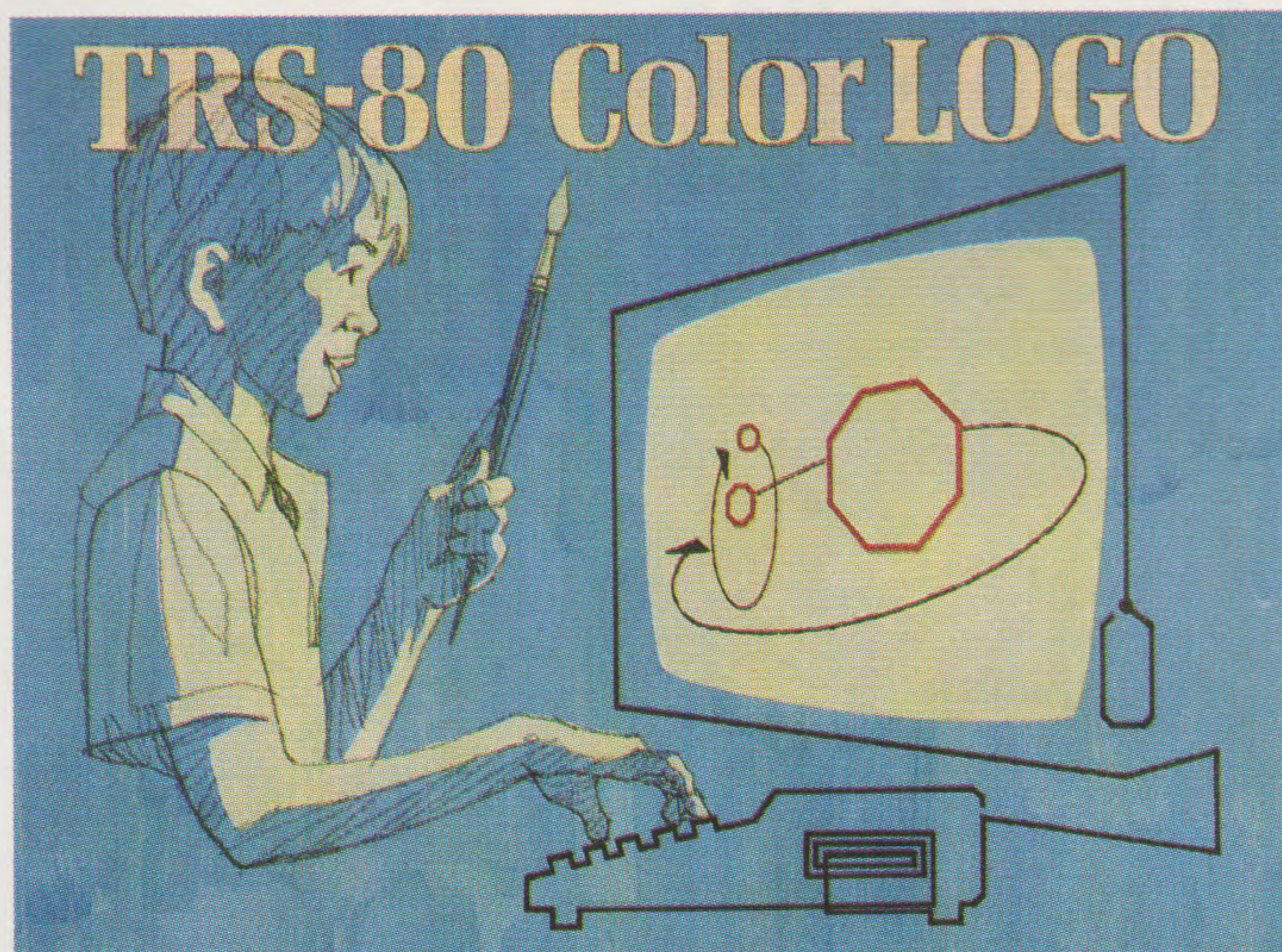


Our **History of Technology** packages use color graphics, text, sound effects and recorded speech. Each package includes four lessons with student interaction and feedback messages. The 16K Color Computer and cassette recorder are required.

Pioneers in Technology (26-2624, \$94.95) includes The Age of Flight, Space Exploration, The Electric Age and History of Computers. **Inventions That Changed Our Lives** (26-2625, \$94.95) includes Edison's Electric Inventions, Bell and the Telephone, The Story of Railroads, and The Age of Television.

*Network 3 compatible

Our Colorful Programming Language For Learning



Our Color LOGO programming language is designed to help students grasp fundamental programming concepts. Through manipulation of a "turtle" on the screen, students learn to program. The computer becomes a friendly learning tool, and students gain valuable insight into advanced mathematical, geometric and logical concepts. In addition, Color LOGO is versatile. Children under reading age can use Color LOGO's "doodle" mode to create their own graphics using predefined one-key commands. For older children, Color LOGO features a "hatch" command which allows creation of multiple turtles that are capable of running separate programs simultaneously. Our **Disk Color LOGO** (26-2721, \$99) requires a 32K Extended BASIC Color Computer and disk drive. The **Program Pak™ Color LOGO** (26-2722, \$49.95) requires a Standard BASIC Color Computer. Use your own TV with either version.

Our **Color LOGO Teacher's Book** (26-2761, \$3.95) gives you instructional ideas and activities for presenting LOGO in the classroom. It includes special pages that can be photocopied and used as class handouts.

The **Color LOGO Parent's Book** (26-2763, \$3.95) is designed for parents and children to learn LOGO together at home.

Color LOGO Lab (26-2770, \$199) provides a complete guide for teaching Color LOGO. Includes teacher's manual, student workbooks and overhead transparencies. **Additional Student Workbooks** (26-2771, \$2 each) are available.

Radio Shack Makes Courseware Development Easy



Our authoring systems make it easy to create courseware. No programming knowledge is required. Each program requires a Model III or Model 4 disk system.

TRS-80 AUTHOR I

(26-1727, \$149.95) is a screen-oriented authoring system with full-screen editing, graphics and score-keeping option. Sample lesson included.

TRS-80 AUTHOR I Lesson Presentation Package (26-2707, \$64.95) presents lessons that have been created using TRS-80 AUTHOR I. (Not required if you have TRS-80 AUTHOR I).

TRS-80 Network 3 AUTHOR I Lesson Presentation Package (26-2713, \$299) allows you to use the Network 3 Controller to present lessons created with TRS-80 AUTHOR I. Keep a lesson score file on diskette. Requires host computer with two disk drives.

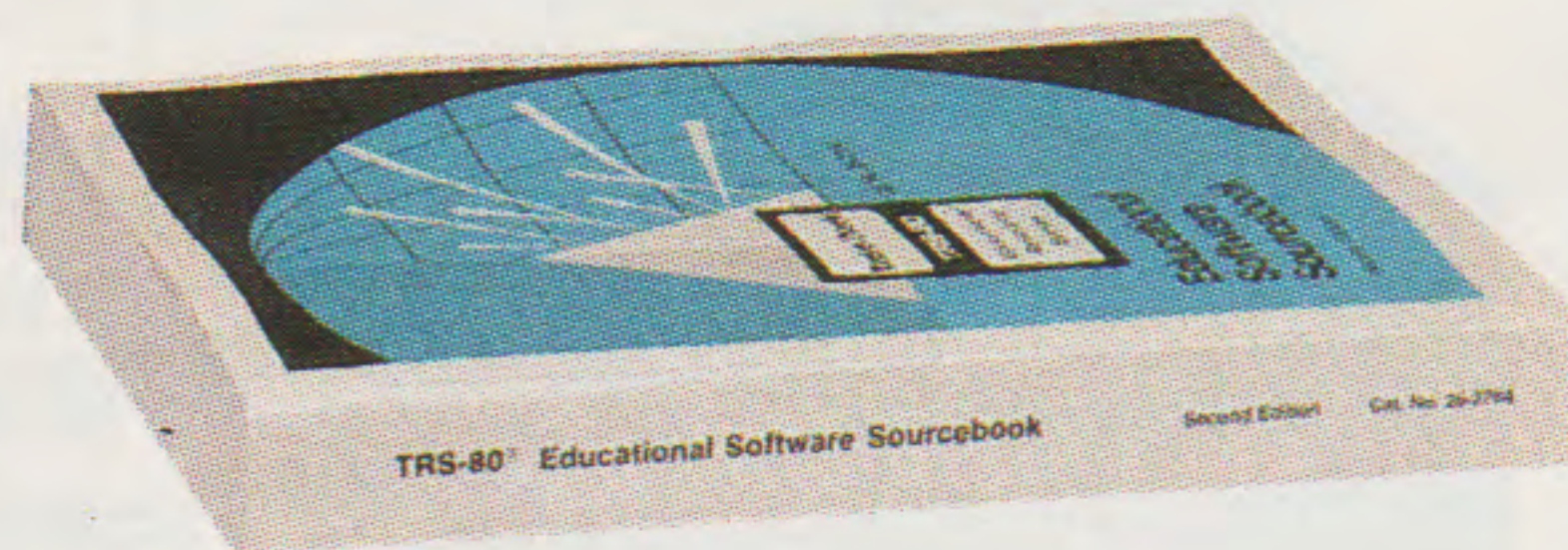
TRS-80 MicroPILOT™ (26-2718, \$119.95) is a command-oriented language that lets you create your own courseware or adapt it from any curriculum suitable for computer assisted instruction. MicroPILOT is based on the PILOT computer language, but offers extended graphics and disk file handling capabilities. Features one-letter commands, upper and lower case characters and branching. Requires a Model III or Model 4 disk system.

Color PILOT lets you mix text and high-resolution graphics. It features a line editor and easy one-letter commands. Graphics operators include color, line, box, window and more. Display options include upper and lower case characters. **Disk Color PILOT** (26-2710, \$79.95) requires an Extended BASIC Color Computer with disk drive. **Tape Color PILOT** (26-2709, \$59.95) requires a Standard BASIC Color Computer. Use your own TV with either.

Quick Quiz: A Mini-Authoring System (26-1728, \$39.95) makes it easy to create, store, and give multiple-choice tests. It provides a pre-designed format for typing up to 40 questions with four answer choices per question. Scores can be printed or stored on disk. Requires a Model III or Model 4 disk system.

Helpful TRS-80 Educational Resource Materials

The second edition of our **TRS-80 Educational Software Sourcebook** (26-2764, \$6.95) is a complete guide for educational courseware for TRS-80



computers. It contains over 1200 vendor-furnished listings of programs classified under 14 subject areas. Each listing gives program content, grade level, instructional technique used, and hardware required. Many listings contain user-site references. Also includes publisher profiles.

The **TRS-80 Microcomputer Information Handbook for Educators** (26-2757, \$2.50) describes what microcomputers and courseware are, and how they can be used.

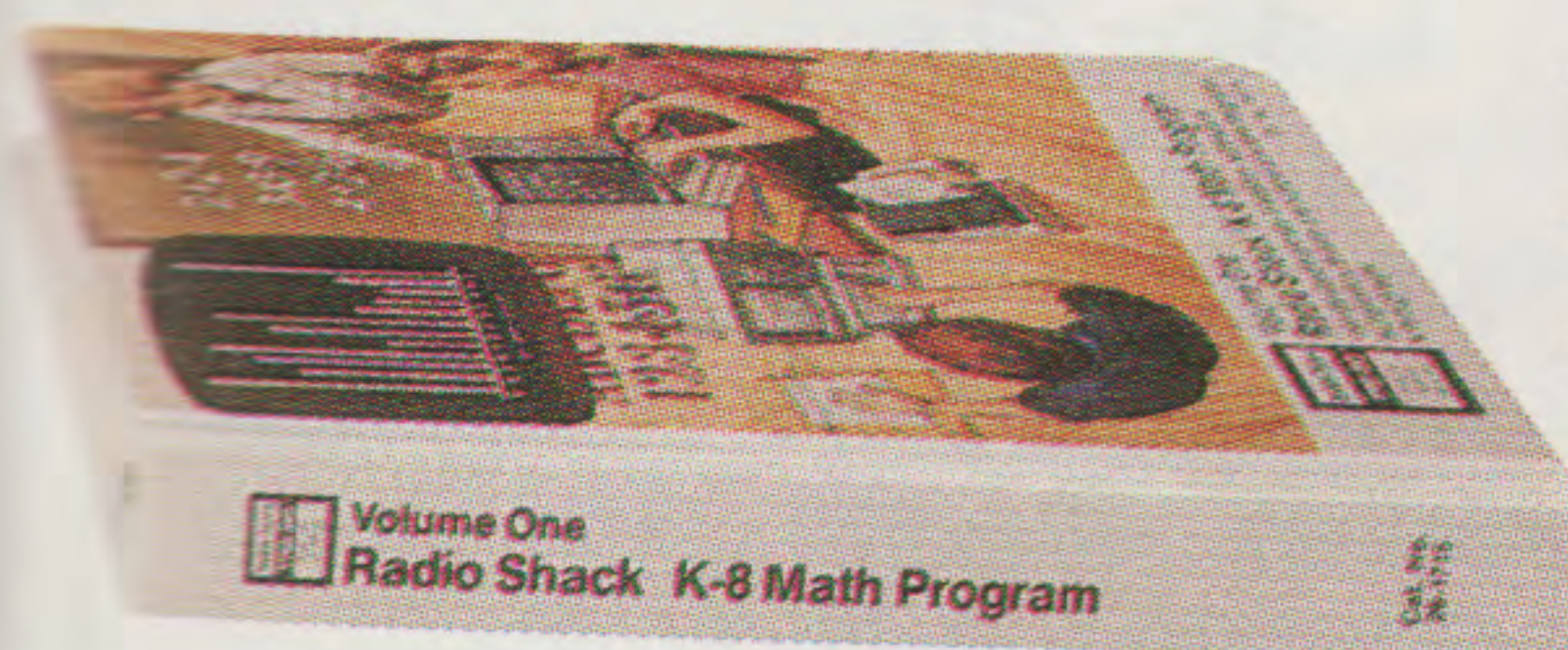
Radio Shack's Proposal Writing Guide (26-2754, \$9.95) is a guide for educators who want to write proposals for funding from an outside source for computer-related education projects.

My TRS-80 Likes Me (26-2751, \$2.50) is a teacher's guide to helping elementary students understand BASIC.

Number Patterns (26-2752, \$2.50) shows how to introduce sequences and series using computers.

Math, Science and Business Courseware

K-8 Math Series



This series of programs supplements regular classroom math instruction in Kindergarten through eighth grades. Each program includes lesson summaries and a

K-8 Math Cross-Reference to six of the most commonly-used math basals.

The **K-8 Math Program, Vol. I** (*26-1715, \$199) provides randomly generated drill and practice problems in number concepts, addition, subtraction, multiplication and division. A Model III or Model 4 cassette system is required.

The **K-8 Math with Student Management, Vol. I** (*26-1725, \$199) combines the K-8 program with a student management capability to monitor promotions and demotions, allow for teacher review of scores, and begin each student in the appropriate lesson each session. A Model III or Model 4 disk system is required. Printer is optional.

The **K-8 Math Worksheet Generator** (26-2162, \$99.95) prints worksheets and answer sheets from K-8 Math lessons. Worksheets can be saved on disk. A Model III or Model 4 disk system and TRS-80 line printer are required.

Help Prepare Students for the World of Business

Our **Corplan™** business simulation program (*26-2619, \$49.95) gives instructors an effective way to demonstrate the many facets of business management. Corplan realistically simulates the operations of a company. Designed for use by the advanced secondary or college-level student, Corplan requires no previous knowledge of computer operation or business programs.



Corplan puts a player or a team of players in control of an imaginary corporation. Students have the responsibility of planning quarterly production, and making sales and financial decisions that will make or break the company. The computer keeps track of each quarter's decisions, calculates immediate results, gives immediate feedback such as "cash shortage", "plant congestion" or "bankruptcy", and maintains the books through a maximum of 12 quarters. Corplan also displays complete accounts and balance sheets. An easy-to-use auxiliary program lets the instructor modify the parameters of the game to create different business situations or to set new challenges for the student.

Corplan requires a Model III or Model 4 disk system. An optional printer can be used to produce copies of the program's charts and reports.

Sharpen Your Students' 10-Key Skills

Our **Numeric Data Entry Practice** (*26-2601, \$39.95) is a 25-lesson practice course to help students develop speed and accuracy in the 10-key entry of numeric data. Using the TRS-80 standard numeric keypad, students "key in" numbers, and the computer graphs and records performance. It requires a Model III or Model 4 disk system. Printer is optional.

Secondary Math and Science

The **Solar System: Featuring the Discovery of the Planet Pluto** (26-2647, \$59.95) combines high-resolution graphics and recorded

speech to present facts about the planets. A 16K Color Computer, TV and cassette recorder are required.

Our **Essential Math Program, Vol. I and II** are drill and practice programs for grades 7-12 and are available on cassette or disk for Model III and Model 4. **Essential Math, Vol. I** (*26-1716, \$199) includes exercises in addition, subtraction, multiplication, division, and more. **Essential Math, Vol. II** (*26-1719, \$199) covers fractions, decimals and percents, and pre-algebra concepts.

Euclid Geometry Tutor (*26-1724, \$39.95) allows students to practice constructing proofs using nine basic postulates.

Advanced Graphics (*26-1714, \$39.95) gives practice in analyzing equations, and plots graphs of functions and polar and parametric equations.

Vector Addition (*26-1720, \$39.95) illustrates and plots components and sums of student-provided vectors. **Vector Addition for the Color Computer** (26-2638, \$39.95) requires Extended BASIC and is available on cassette or disk.

Interpreting Graphs in Physics: Position and Velocity vs. Time (*26-1721, \$39.95) poses graph-related questions.

Graphical Analysis of Experimental Data (*26-1722, \$39.95) plots data pairs that the student inputs.

Investigations in Integral Calculus (*26-2600, \$39.95) graphs and computes areas of functions. **Investigations in Integral Calculus for the Color Computer** (26-2641, \$39.95) requires Extended BASIC and is available on cassette or disk.

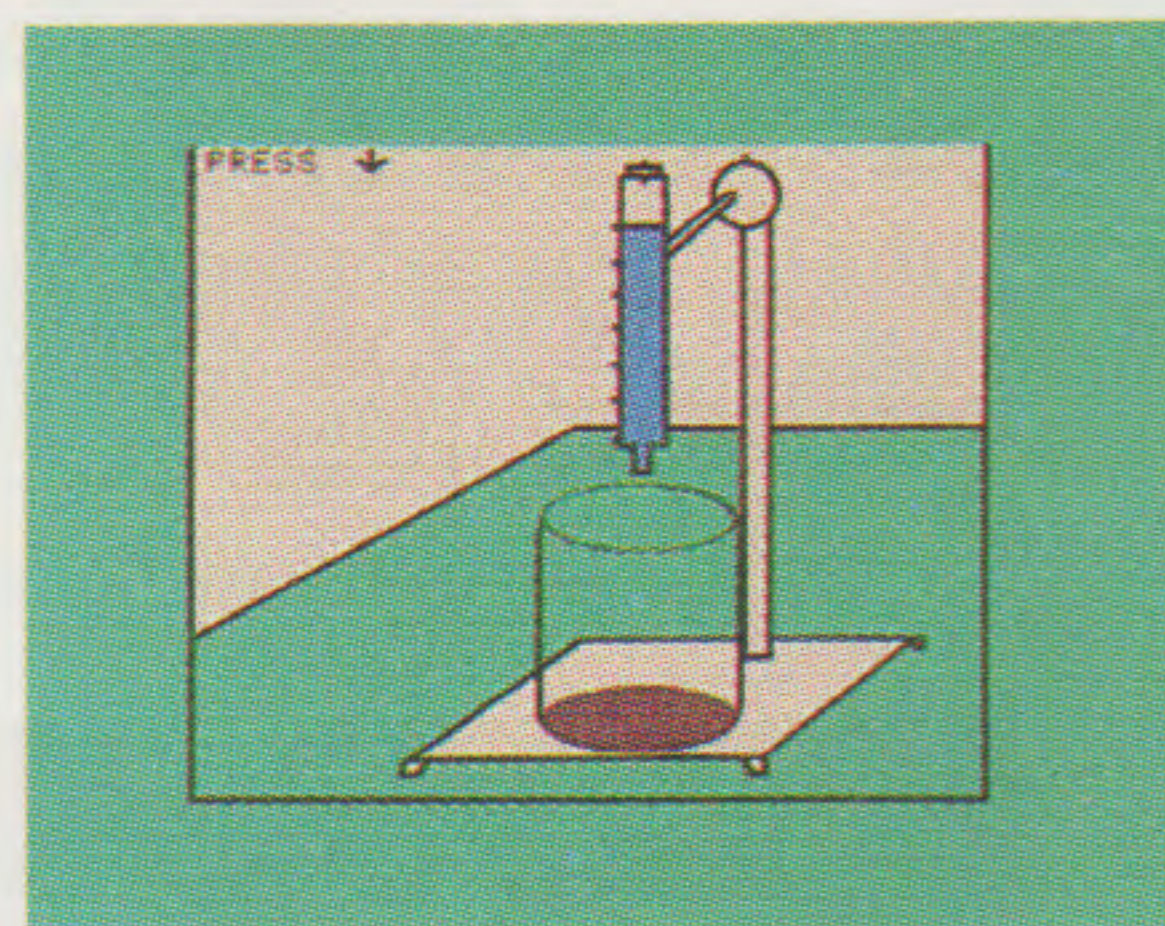
Plane Analytic Geometry (*26-2602, \$39.95) includes problems on straight lines and conic sections.

Number Theory (*26-2613, \$69.95) includes definitions, examples and exercises on number theory concepts.

Matrices, Determinants, and Simultaneous Equations (*26-2620, \$49.95) generates problems related to simple matrix algebra.

Quadratic Equations (*26-2623, \$49.95) covers coefficient recognition, discriminate evaluation, type of roots, and more.

Not including Color Computer programs, the above programs are available on cassette or disk for Model III and Model 4.

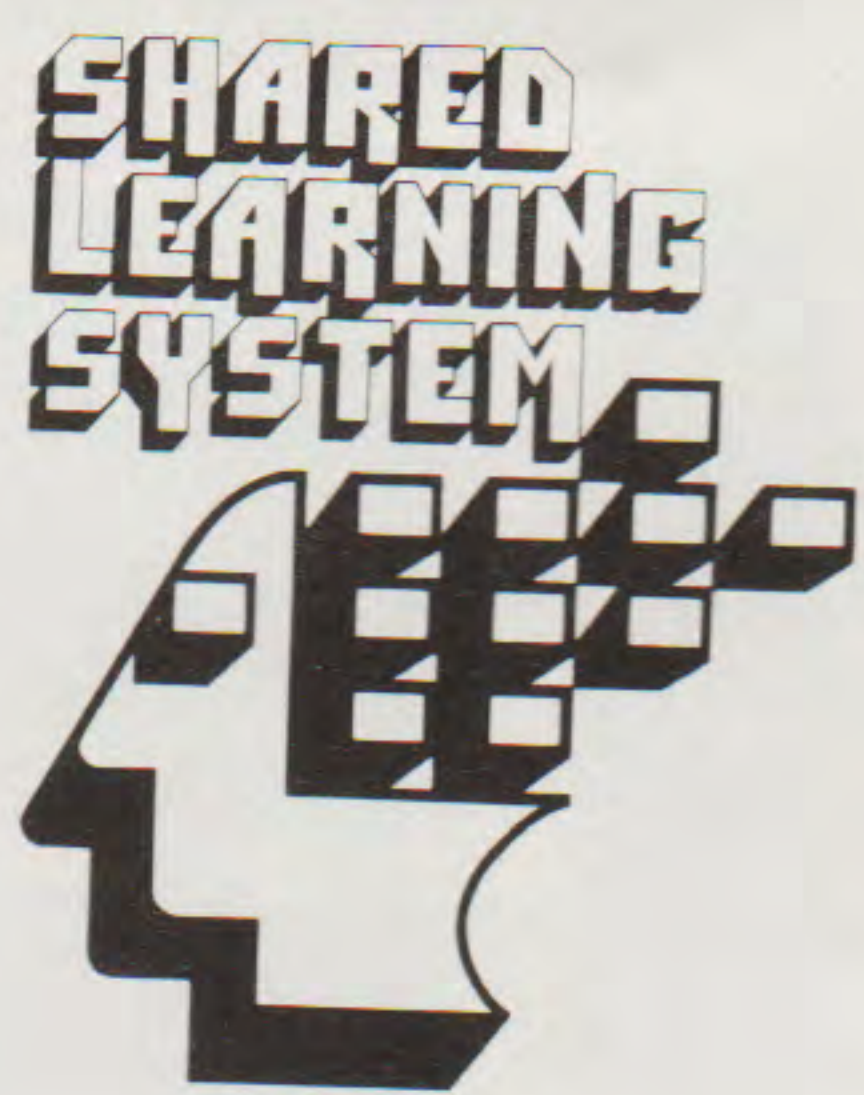


Electronic Chemistry Lab

The **TRS-80 Chemistry Lab** uses graphics and equations to simulate chemical reactions. Students control variables for six topics.

TRS-80 Chemistry Lab, Vol. I is available on cassette or disk for Model III and Model 4 (*26-2609, \$199), and on cassette for the Color Computer with Extended BASIC (26-2626, \$199). **Additional Student Experiment Books** (26-2666, \$3 each) are available.

*Network 3 compatible

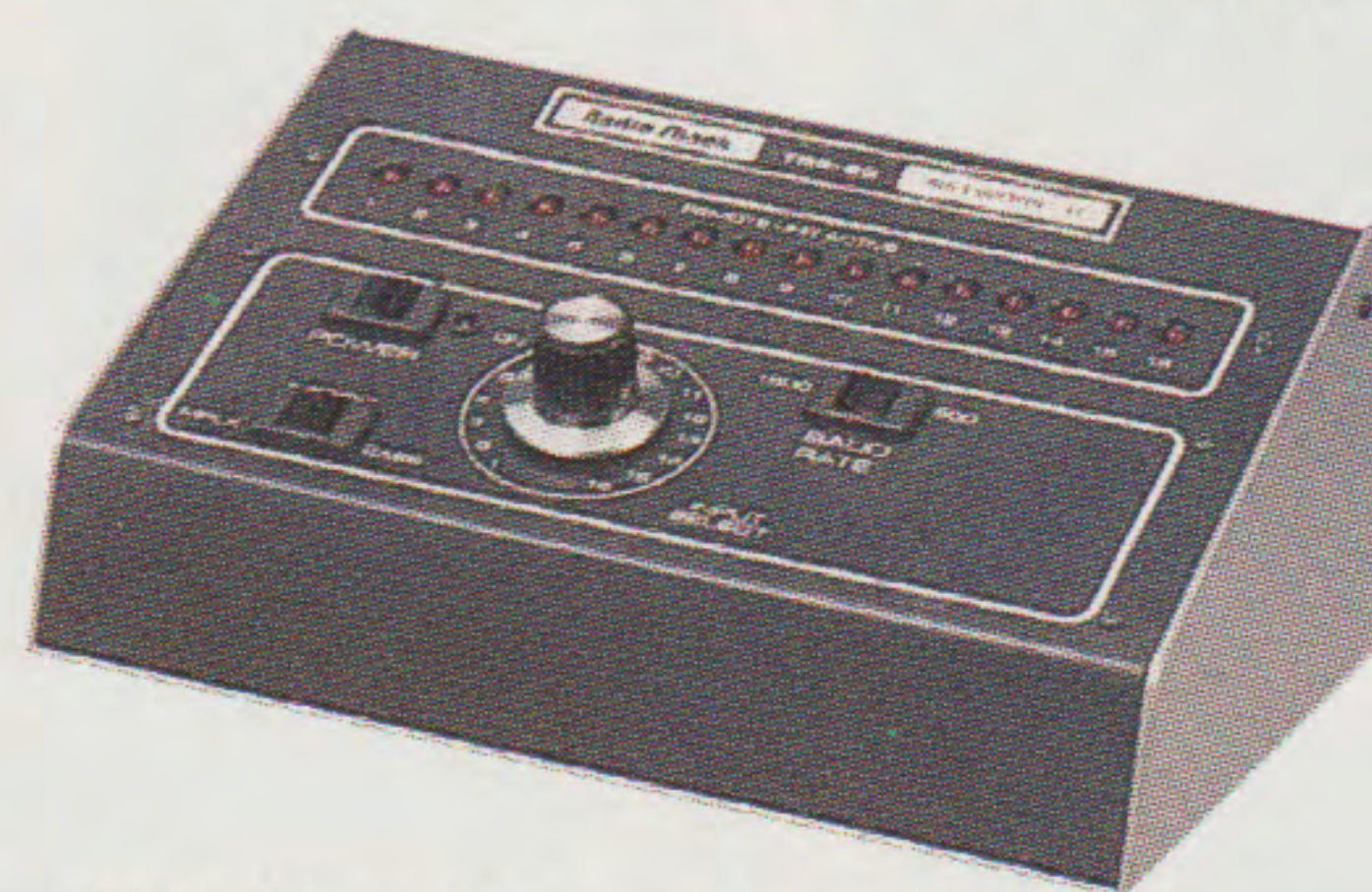
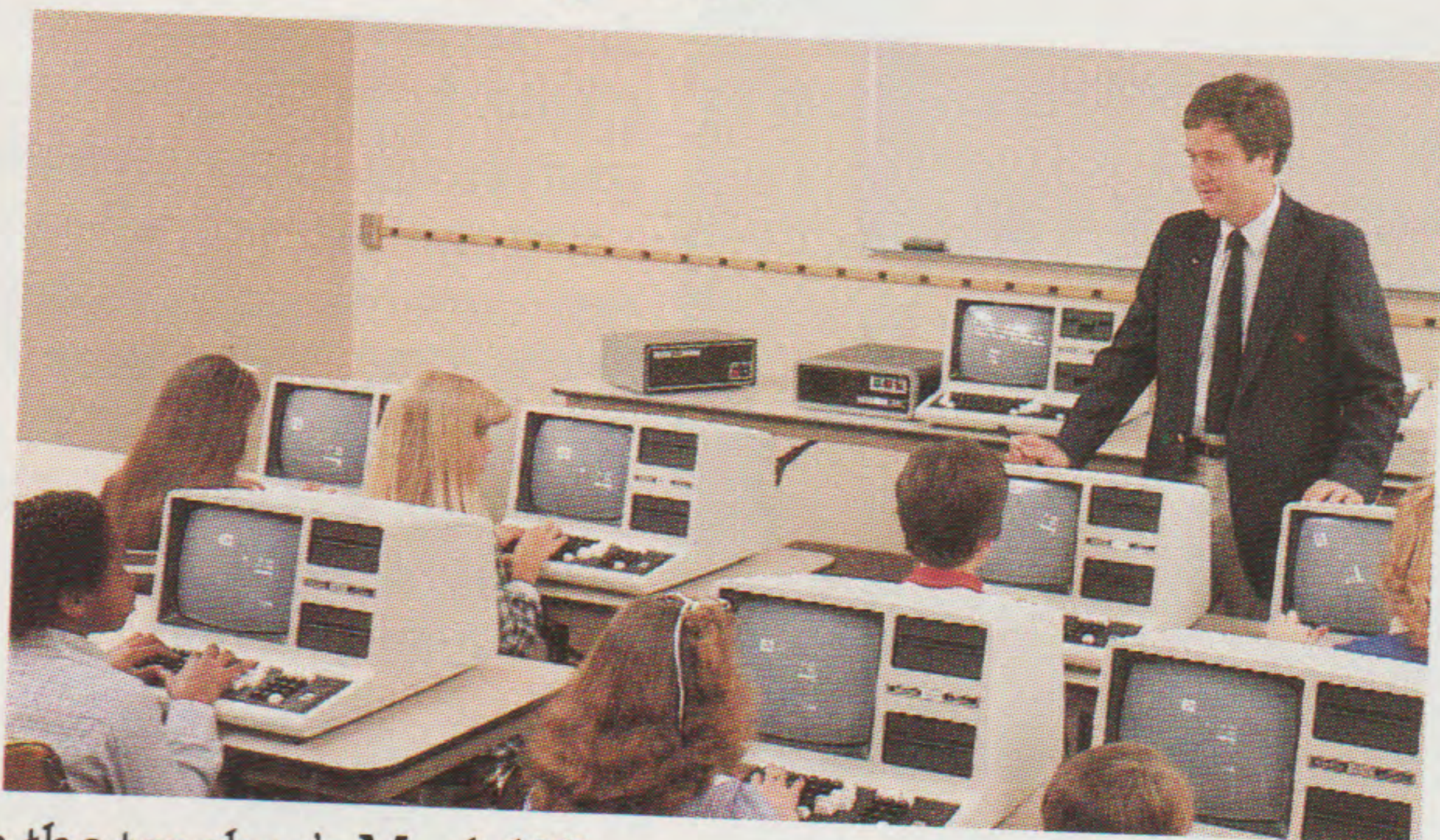


TRS-80 Shared Learning Systems

A **TRS-80 Network Controller** lets you implement a shared learning system—up to 16 non-disk student stations connected to the teacher's disk, or "host" computer. Students can access programs from disk with low-cost TRS-80 non-disk computers. The teacher can send programs to the student computers, and student work can be saved on the teacher's diskettes. Your computer lab requires less duplicate courseware because several students share the same software. In addition, we offer a choice of two controllers to meet your particular networking needs.



The **Network 3 Controller** (26-1212, \$599) enables up to 16 non-disk Model III or Model 4 student workstations (with RS-232C interfaces) to select and access lessons stored on the teacher's Model III or Model 4 disk system. As a result, the teacher is freed from repeatedly loading programs. Under software control, programs can be stored on the host disk. An optional line printer attached to the host computer lets students get printouts of their programs without teacher assistance. Network 3 is designed for use with the educational software packages indicated in this catalog by an asterisk (*). Connecting cables available separately. Requires Network 3 Operating Software (below).
Network 3 Operating Software (26-2775, \$149) supports the Network 3 host and its student stations with many of the capabilities of TRSDOS and Disk BASIC. Students can SAVE and LOAD programs to and from the host disk.



Radio Shack's **Network 2 Controller** (26-1211, \$499) enables up to 16 non-disk student stations to be connected to the teacher's host computer using the cassette ports. The teacher can download programs to all stations simultaneously, or upload programs from individual stations. With an optional printer connected to the host computer, student programs can be loaded into the host and printed out. The Network 2 Controller can be used with a Model III or Model 4 disk and non-disk computers; with Color Computer disk and non-disk systems; or with the Model 100 computer. And now the Network 2 Controller can be used with our MC-10 Micro Color Computer. Use an MC-10 or Color Computer as host and MC-10s as student stations. (MC-10 programs cannot run on the Color Computer, but they can be loaded and saved using tape or disk). Controllers can be cascaded to connect more stations. All cables are included.

Our TRS-80 Education Management Systems

TRS-80 School Administrative Software
Student Information System (26-2729, \$249) helps school administrators simplify the burden of record-keeping. Schools can easily collect, record, update, retrieve and distribute student data. A special inquiry feature lets you enter criteria into the computer and print a list of all students meeting those criteria. Address labels for students or parents can also be printed. The Student Information System requires a TRS-80 Model II or Model 12 computer with a floppy disk drive and a hard disk, or a Model 12 with two floppy disk drives.

Additional modules for attendance, grades and scheduling will soon be available. These programs, the Student Information System and the CR-510 Card Reader (right) will allow administrators to compile and analyze large amounts of data.

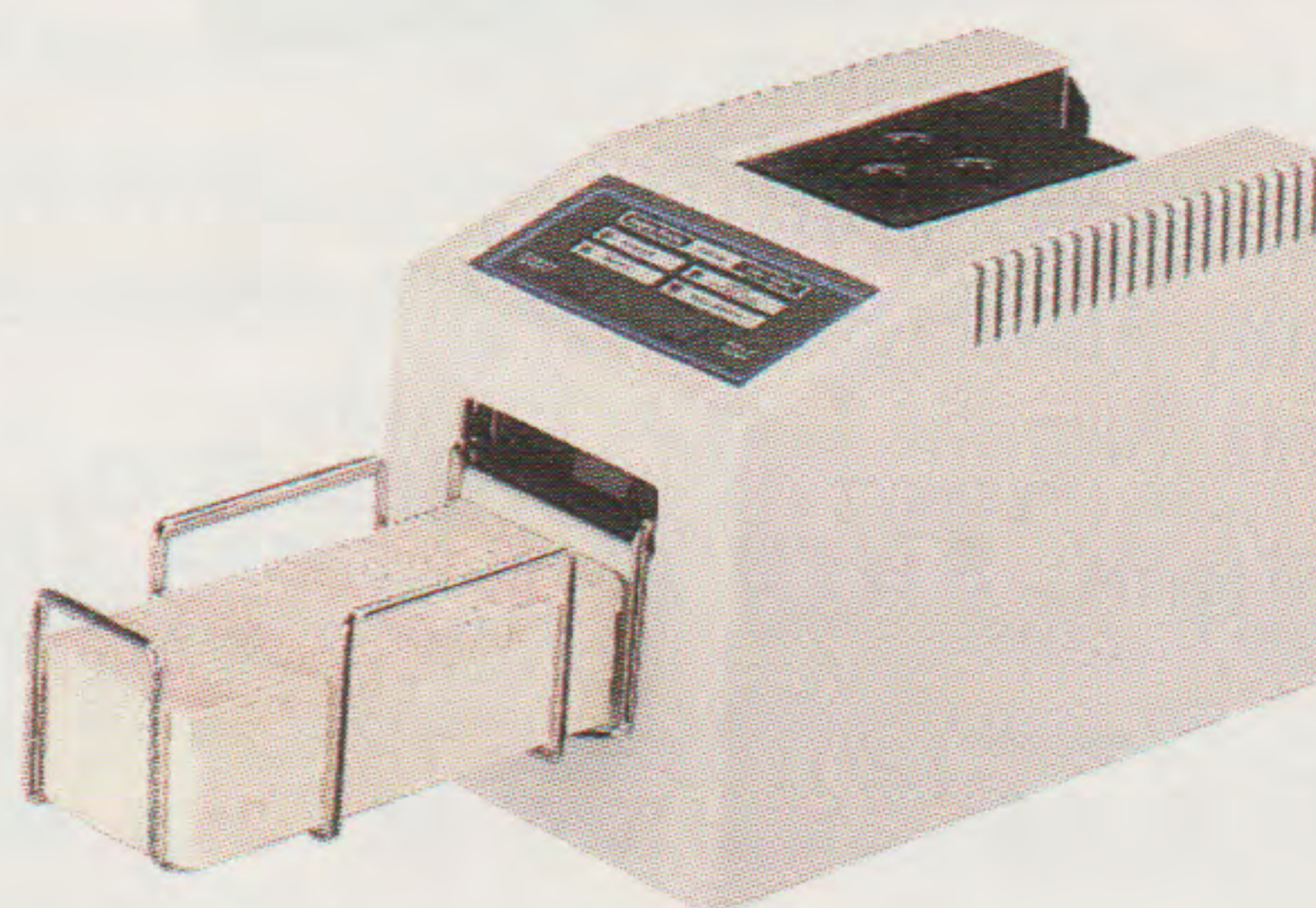
Football Analysis

Record and analyze scout information on your opponent's offense with **CHAMPS™** (26-2703, \$9.95). Designed for school and college coaches, CHAMPS provides various charts and statistical reports. Includes ten CHAMPS Scouting Manuals. **Additional Scouting Manuals** (26-2708, package of 10 for \$9.95) are available. Requires a Model III or Model 4 disk system and a 132-column printer.



Card Reader

Automate data compilation, evaluate surveys and polls, or correct multiple choice tests with the new **CR-510 Card Reader** (26-1266, \$1595). It provides single, demand or continuous feed operation, reads marked or punched cards, and is controlled through manual switches or software. The CR-510 includes a diskette with COBOL and BASIC driver routines, and requires a TRS-80 computer with RS-232C port. Cables available separately.



(26-2725, \$499), **Counselor's Version** (26-2726, \$499) and **Special Programs Version** (26-2727, \$499). A Model III or 4 disk system is required.

Get Quick Access to Student Data

REKORD Planner is a data management system adaptable to your own needs. A program and tutorial diskette, plus sample formats are included. Choose from **Administrator's Version**

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Radio Shack's Computer Education Series

BASIC Programming

These complete classroom packages for secondary and post-secondary levels include overhead transparencies, a teacher's manual and 25 student workbooks.

Part 1: Introduction to BASIC (26-2150, \$220) introduces students to the TRS-80 and BASIC.

Additional Student Workbooks for Part 1 (26-2151, \$3.50 each) are available.

Part 1: Videotape Lessons (26-2753, \$349) is a series of ten 30-minute lessons based on Part 1: Introduction to BASIC. Requires the Part 1 student workbook.

Part 2: BASIC Programming (26-2152, \$260) builds on the concepts introduced in Part 1. **Additional Student Workbooks for Part 2** (26-2153, \$4.50 each) are available.

Part 3: Advanced BASIC (26-2154, \$260) introduces the INKEY\$ statement, ASCII character set, action graphics and more. **Additional Student Workbooks for Part 3** (26-2155, \$4.50 each) are available.

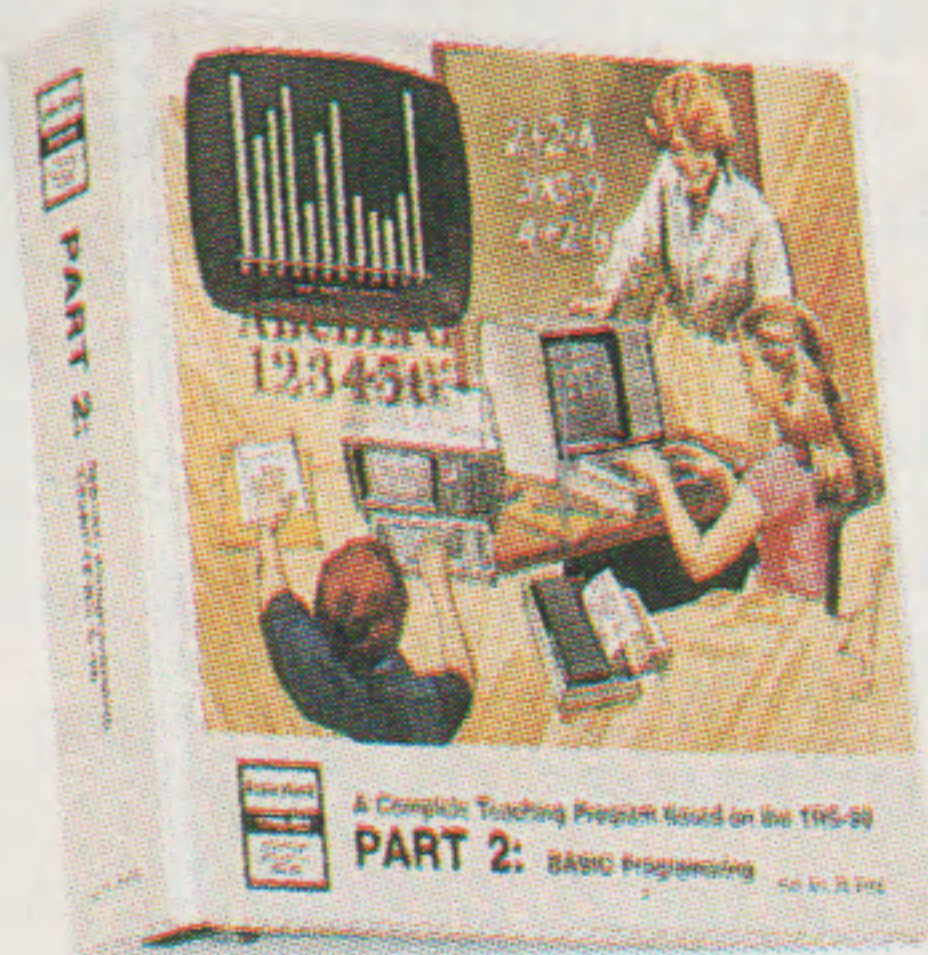
Part 4: TRSDOS (26-2156, \$299) covers concepts of the TRSDOS operating system. **Additional Student Workbooks for Part 4** (26-2157, \$4.50 each) are available.

Introduction to TRS-80 Level II BASIC (26-2116, \$9.95) is a beginning BASIC textbook for secondary students.

NOTE: Software not included in the above series. Student activities are designed for hands-on experience with Level II or Model III BASIC (or TRSDOS in Part 4).

TRS-80 COBOL Course

COBOL for Models II, 12, and 16, Vol. One (26-2706, \$49.95) teaches fundamental concepts. Requires COBOL Development System (26-4703, \$299) and a Model II, 12, or 16 computer. Use it as a self-teaching tool, or with **Class Notes** (26-2723, \$9.95) for class instruction.



Learn Machine Language

The **Illustrated Computer** (26-2670, \$44.95) introduces secondary students to machine language. The program illustrates a computer to be programmed requires 32K Extended BASIC. Computer with disk drive.

Computer Literacy Packages

Computer Discovery™ introduces computers, their evolution and impact on society, and basic programming concepts. Each includes interactive exercises, 25 workbooks, and instructor's manual.

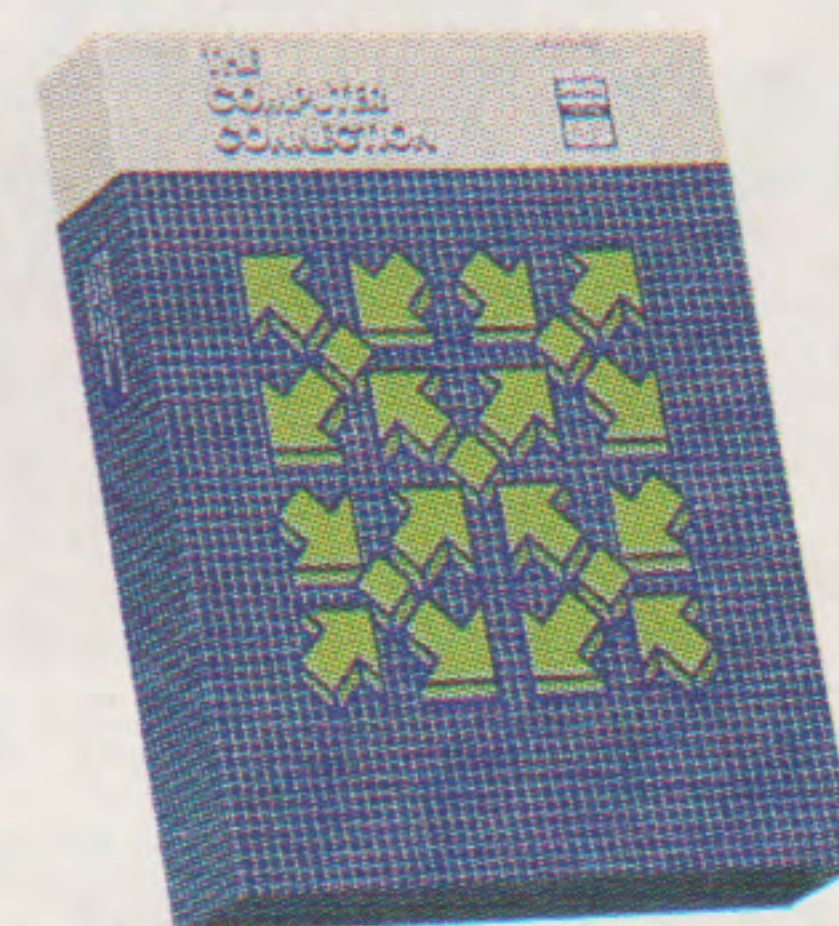
Computer Discovery for Junior High (26-2630, \$189.95) requires

a Model III or Model 4 disk system. **Additional Workbooks** (26-2631, \$4.25 each) are available.

Computer Discovery for Senior High (26-2632, \$189.95) requires a Model III or Model 4 disk system. **Additional Workbooks** (26-2636, \$4.25 each) are available.

Careers in Computing (26-2758, \$130) helps secondary students explore computer-related careers. Includes teacher's guide, 30 student manuals, narrated filmstrip, spirit masters and wall chart. **Additional Student Manuals** (26-2759, \$1 each) available.

Computer Literacy: Computers Past and Present (26-2759, \$9.95) is written for students in grades 4 through 8. Includes teacher's guide, six spirit masters and wall chart.



The **Computer Connection** (26-2663, \$69) introduces basic computer literacy to junior and senior high school students, and is adaptable to most subject areas. Includes teacher's guide, spirit masters, four wall charts and narrated filmstrip.

Radio Shack and TRS-80 are #1 in the Classroom

Radio Shack is the leading marketer of microcomputers to schools, with more TRS-80 computers in America's schools than any other brand. And we maintain an extensive development effort to produce educational materials that use microcomputer technology in the best ways possible.

We offer educators a variety of special services. Our National Bid Department gives prompt attention to school bids. Our National Lease Department can put the TRS-80 into your classroom with terms that meet almost any budget. We offer "carry-in" and "on-site" service plans, too. And as an educator, you are eligible to attend our educator's workshop or Part 1 or Part 2 BASIC classes, without charge, at one of over 400 Radio Shack Computer Centers.

Radio Shack gives you complete support. We have 25 Regional Educational Coordinators located across the country. They can conduct demonstrations, workshops, and service training sessions for your school district. And our Regional Educational Coordinators can assist you in selecting the computer system and courseware that best suit your needs. For more information, visit your nearest Radio Shack Computer Center or participating store or dealer. Or call your Regional Educational Coordinator.

For the name of the full-time Regional Educational Coordinator in your area, call our Education Division at 800-433-5682, toll free. In Texas, call 800-772-8538.

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News (continued)

ested should send a self-addressed, stamped envelope to Henry Rasof, Associate Editor, Arco Publishing, Inc., 215 Park Avenue South, New York, NY 10003.

Write No. 418 on Inquiry Card

Software Developed for Apple's Lisa

Apple Computer recently announced that 165 software companies worldwide are developing applications software for the Lisa personal computer. The first of these applications to reach the market is a multi-user, Xenix-based accounting system developed by Open Systems, Inc.

Other products are under development at software companies throughout the United States, including Aardvark Software, AMI Systems, BPI Systems, Business and Professional Software, Compu-graphics, Context Management Systems, Formative Technology, Digital Research, Execucom Systems, Microfocus, Microsoft Corp., Oracle Inc., Orchid Software, Science Management Corp., Software Publishing, and Strategic Products International.

Initial software offerings from these companies will be aimed at customers in the office market, which Apple targeted with its first six Lisa applications, and at customers in smaller businesses who require accounting, inventory, and other specialized applications.

Open Systems, Inc., a Minnesota-based vendor of accounting software, is first to the market with seven interactive accounting applications and a complementary report writer and data formatter.

The accounting series, known as the Software Fitness Program, includes modules for accounts receivable with billing and sales analysis functions, accounts payable, general ledger, inventory, payroll,

sales order processing, and a fully-integrated job cost system.

The report writer, called the Team Manager, creates custom reports using data from the accounting applications. It can format data to be compatible with many popular word processing, spreadsheet, and data base management systems.

Open Systems' products, the first Lisa applications to run under Xenix, add the multi-user dimension provided by that operating system to the Lisa's capabilities. One Lisa system can act as a "host" for Apple II, III or other Lisa personal computers, or for several types of terminals. This allows users in different locations to utilize the software and the information base resident in the host Lisa system.

Write No. 419 on Inquiry Card

Program Allows Colleges to Sample Software

Now users can sample educational software before they buy it. Through a program developed by Conduit, a publisher of educational software, and Verbatim Corp., educators can review free demonstration software on subjects ranging from chemistry to Spanish and French.

The free software offer was made possible through the donation of 5,000 5-1/4" Datalife mini-disks from Verbatim, a supplier of magnetic media products. After selecting and designing the programs, Conduit began distributing the demo disks to college professors, computer education groups and secondary school teachers across the country.

Recorded on each disk is an excerpt from complete programs offered by Conduit. In addition to the fields of chemistry and a number of foreign languages, programs in three levels of mathematics, English, biology and an educational game are also available.

Verbatim supplied its Datalife mini-disk to Conduit for the demos.

Each mini-disk can store about 400 pages of single-spaced typewritten text on 8-1/2" by 11" paper, and each disk has a life expectancy of 30 million revolutions.

Write No. 402 on Inquiry Card

TI Computer to be Marketed with Courseware

Texas Instruments has announced the signing of a three-year, multi-million dollar reseller contract with United Education & Software (UES)/Spectrum, a consulting and custom software supplier for the education industry.

UES/Spectrum—which provides turnkey computer solutions to both public and private trade, technical and career schools in the United States—plans to bundle the TI Professional Computer with microcomputer courseware and educational software from UES.

According to Aaron Cohen, president of UES, "we chose to sell the TI Professional Computer because it gave us the performance needed for application, the ability to expand and a price that made our package competitive and profitable."

UES plans to market these education packages to as many as 6,000 accredited schools which graduate more than 1.5 million students annually in careers specially suited to using the microcomputer as a tool. Such careers include business and secretarial fields, accounting, medical and legal, word processing, programming and data entry.

Students using the UES courseware package will learn how to use a computer and how computer technology can be applied to their specific career paths. In addition, students will have the opportunity to take their computer systems with them upon graduation.

Write No. 409 on Inquiry Card

(continued on page 32)

Write No. 104 on Inquiry Card

News (continued)

Z-100 Chosen for University Use

Zenith Data Systems Corp.'s Z-100 computer system has been selected as the official desktop computer for academic, faculty and student use by the College of Engineering at the University of Southwestern Louisiana (USL) at Lafayette.

The university will purchase Z-100's for a central engineering microcomputer laboratory, classroom and faculty use. With USL's cooperation and support, Zenith is extending the agreement to include personal purchases of the Z-100 by students and faculty.

Zenith has been working with the University to prepare both students and faculty for use of the Z-100. Last spring Z-100's were provided for familiarization and a comparison computer laboratory. Zenith personnel also conducted a week-

long on-campus training session for faculty members.

Write No. 425 on Inquiry Card

Contest Directed at SAT Students

The "Great American SAT Contest" is being sponsored by Krell Software Corp., a manufacturer of computerized exam preparation materials.

Krell will award \$50,000 worth of educational computing hardware and software in two categories to students achieving the highest SAT scores, and the greatest improvement in SAT scores.

To qualify, students must have used Krell's College Board S.A.T. Prep. Series, either at home or in school.

Krell also will give each winner \$1,000 worth of educational software to donate to a school of his or her choice.

Write No. 423 on Inquiry Card

Students are Plants in Simulation Game

Freshman biology students at Texas A&M University are learning first-hand how it feels to be a dying plant. Through a computer exercise, the students each become a struggling seedling that competes with surrounding vegetation for light, water and nourishment. Most of them will "die" during the exercise, but there is still hope: they can play the game again.

The computer program, called "Seedling," is one of four being developed at Texas A&M through a grant from the National Science Foundation for use in general biology laboratories across the country. Funds for the program also come from Radio Shack.

In "Seedling," each student or team of students must decide daily how much photosynthate to allocate for growing roots, leaves, stem girth and stem height. They try to outlast competing seedlings by avoiding starvation, wilting, being blown over, or being eaten by a grazing animal.

A student can test his or her abilities against other students or the computer itself. Before each contest, the student can choose to grow in the dry, Trans-Pecos area, humid Houston or Tropical Puerto Rico.

"It's a game and it's addictive," said Dr. Robert Kosinski, a biologist and co-investigator on the project with Dr. C.O. Patterson, director of the freshman biology program at Texas A&M.

"Students are notoriously committed to getting out of biology labs early, but we've had to pry them out 20 minutes after lab was over because two teams were neck and neck in Seedling," Kosinski said.

When a student loses at Seedling the computer may report: "You have starved to death." An audio attachment plays "Taps."

Other programs deal with medical examination of an alien

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Write No. 115 on Inquiry Card

brought back to Earth, a shark's search for food, and investigation of metabolic pathways. Once perfected, the programs and corresponding manuals will be made available to other colleges and universities.

Write No. 438 on Inquiry Card

Lower Schools May Spend \$1.4 Billion on Computers in 83/84

During the 1983-84 school year, elementary and secondary schools in the United States are projected to invest approximately \$1.4 billion in microcomputer hardware and software—an average of \$54,560 per district—solely from funds available under nine federal government grant programs.

A compilation of data from the International Communications Industries Association and TALMIS, an Oak Park, Ill., consulting service, indicates that lower school microcomputer expenditures constituted 15 percent of 1982-83 instructional hardware budgets, but should increase to 75 percent within the next four years. Of the total expenditures by schools, TALMIS estimates that more than 57 percent comes from district funds, and about 22 percent from federal sources.

The following federal allocations have been made for this school year and are available to the nation's 15,159 public school districts and approximately 10,500 non-public school districts:

Chapter I	\$3,200 million
Chapter II	\$451 million
Title II-A	
(disadvantaged training)	\$1,900 million
Title II-B	
(summer youth training)	\$711 million
Title III	
(dislocated worker training)	\$167 million
Handicapped State Grants	\$1,000 million
Vocational Education	\$729 million
Adult Education	\$95 million
Bilingual Education	\$138 million

Out of the total \$8.4 billion, it is estimated that school districts will

invest \$664 million in communications equipment. If that figure represents only 22 percent of the total, the combined expenditure is approximately \$3 billion.

Assuming that microcomputer hardware and software comprises 47 percent of the "communications equipment" investments, industry estimates place 1983-84 computer budgets at a total of approximately \$1.4 billion throughout the United States. Not included in that figure are similar investments by colleges, universities, military school systems and industrial training facilities.

Write No. 422 on Inquiry Card

Computer Faire Calls for Papers

Computer Faire, Inc. (CFI), sponsor of the annual West Coast Computer Faire and the PC Faire, has issued a call for papers to be submitted for the conference programs associated with the two events for the next year.

The ninth annual West Coast Computer Faire will be held March 23-25, 1984, and the second annual PC Faire will take place October 26-28, 1984. Both will be in San Francisco. Interested parties should request a speaker kit from CFI.

The first PC Faire, held August 26-28, 1983, attracted 22,875 attendees. It was the largest PC event ever held, according to David Sudkin, president of CFI.

Write No. 406 on Inquiry Card

Xerox Named Supplier for U of Pittsburgh

The University of Pittsburgh and Xerox Corp., recently signed a multi-million dollar, two-year agreement designating Xerox as the primary supplier of word processing and related office automation equipment to the university.

Under the agreement, Xerox will supply Xerox 860 Information

(continued on page 34)

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Write No. 51 on Inquiry Card

News *(continued)*

Processing Systems, Xerox 8010 Star Workstations, the Ethernet local communications network, electronic printing systems, Xerox 820-II and 16/8 personal computers, Xerox Memorywriter electronic typewriters, reprographic equipment and supplies to the institution at negotiated discounts.

"The goal in selecting Xerox is to provide, for the benefit of our staff and faculty, access to Xerox' full line of office automation products in order to increase the productivity and efficiency of the entire university," said Wesley W. Posvar, chancellor of the university.

As part of the agreement, Xerox will set up an office automation training center and a service support facility on the Pittsburgh campus. The company also will give discounts toward the purchase of

its personal computers to students, faculty and associates of the university.

Write No. 416 on Inquiry Card

Control Data Expands Engineering Education Program

Control Data Corp., recently announced a partnership program designed to provide access for selected U.S. colleges and universities to PLATO computer-based pre-engineering education programs.

The PLATO education program includes four Control Data 110 microcomputers, a one-year subscription to access the PLATO online library and recordkeeping system, four sets of one science or computer science PLATO course and 50 student guides.

Earlier this year, Control Data announced a cooperative engineer-

ing program that provided PLATO computer-based education pre-engineering courses and Control Data 110 microcomputers to 110 colleges and universities at no cost to the schools.

According to a report on engineering education, produced by the American Electronics Association (AEA), increasing amounts of industry resources to public education is a key to alleviating the crises facing engineering education in the United States today. AEA has become another partner in this program by providing support and information access to schools and the public at large.

The courses being offered are from Control Data's lower division Engineering Curriculum, a PLATO computer-based product, that provides freshman- and sophomore-level pre-engineering students with a variety of required courses.

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EPIE & Consumers Union

Write No. 48 on Inquiry Card

courses in mathematics, physics, chemistry, computer science and engineering science are included in the curriculum which has been developed jointly by Control Data and senior faculty members and deans from seven universities.

Write No. 417 on Inquiry Card

CompuPro Adds 14 System Centers

CompuPro, a manufacturer of microcomputer systems and components, has added 14 new Full-Service System Centers—13 domestic and one international—to its consumer marketing network, bringing the total number of outlets to 53 worldwide.

Four centers opened in Texas, two in both California and New York, and one in Alabama, Colorado, Florida, Illinois, Wisconsin, and the Philippines.

Of the 14 new centers, two pre-

viously established system centers—Gifford Computer Systems and American Computers & Engineers—expanded their operations by opening new outlets.

The company plans to have 100 system center locations by early 1984, according to Jim Lanphear, CompuPro national sales manager.

In Texas, the locations of the centers are: CPA Systems, Inc., Austin and Seguin, and Dator Systems, Inc., Dallas. Gifford Computer Systems opened an outlet in Houston.

The California centers are located at: American Computers & Engineers, Berkeley, and OMNI Unlimited, Pasadena. New York's new centers are: Datapro Systems, Deer Park, and Gifford Computer Systems, Amherst.

The other centers are located in the following cities: Cost Plus Computers, Birmingham, Ala.; Rocky Mountain Microsystems, Lakewood,

Colo.; Binary Magic, Satellite Beach, Fla.; Small Business Systems, La Grange, Ill.; Beam International, Madison, Wis. and Corona International, the Philippines.

Write No. 408 on Inquiry Card

Iowa Town to Receive Computer Education Programs

A coalition of business leaders, schools and a college recently signed a contract with Control Data Corp., that provides access to computer-based education for Students in Forest City, Iowa.

Funding for the \$900,000 program came from a group led by John K. Hanson, chairman and founder of Winnebago Industries, Inc., Forest City, and including the Forest City public schools, Waldorf College and Control Data.

The contract clears the way to

(continued on page 36)

HOW DO YOU CONVEY THE EXCITEMENT OF PHYSICS TO HUNDREDS OF STUDENTS? ONE AT A TIME. WITH WILEY EDUCATIONAL SOFTWARE.

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News (continued)

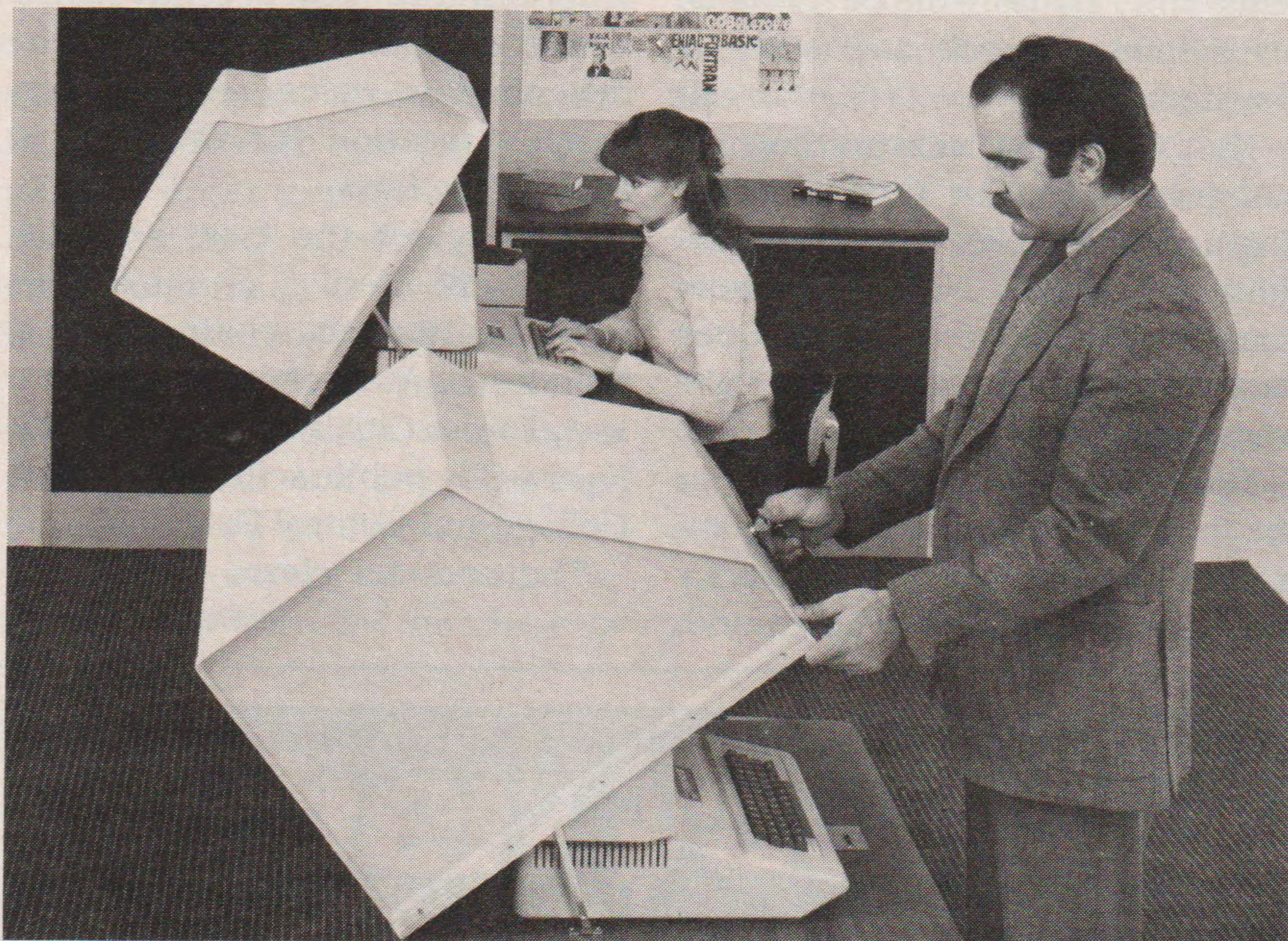
set up a Model Rural Community Education Program that will provide the schools with a variety of PLATO computer-based education programs ranging from basic skills to computer literacy.

The plan will integrate PLATO computer-based education into the

Forest City community through learning laboratories in the elementary, middle and high schools and in Waldorf College, a two-year high education facility based in Forest City.

Hanson proposed the model as an outgrowth of Winnebago's decision to use PLATO computer-based education products and services for employee training. Winnebago, a

leader in the recreational vehicle industry, depends on the rural Forest City area for its labor force. Hanson envisions industry working with education to help schools meet the challenges facing them today, according to Barbara Bulman, director of Inter-Corporate Communications for Winnebago. **Write No. 404 on Inquiry Card**



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Education Research Center to be Located at Harvard

Secretary of Education Terrel Bell announced recently the National Institute of Education will award a \$7,682,000 contract to Harvard University to establish and operate the institute's new School Technology Center.

Bell said the center will become the government's major research facility for determining how technology can be used to improve science, math and computer education across America.

"The center will help lift education in this country out of the abyss of mediocrity," Bell said.

"The establishment of this center could not come at a more critical time in American history," said Dr. Manuel Justiz, director of the National Institute of Education.

"Computers and computer-controlled equipment are penetrating every aspect of our lives. Our country must improve its math and science capabilities if it expects to remain competitive in world economic markets and assure Americans will be able to get jobs in the future," he said.

The center will become one of 17 educational research laboratories and centers supported by the institute across the country.

Harvard was selected as the site for the center over two other finalists — Banks Street College of New York City and the Massachusetts Institute of Technology. Bank Street

(continued on page 37)

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If you'd like to learn more about how Acorn can build you the perfect communications network, write Acorn Computers Corporation, 400 Unicorn Park Drive, Woburn, Massachusetts, 01801, or call toll-free 1-800-225-8001 (in Massachusetts call 617-935-1190). We'd be happy to communicate with you.

ACORN COMPUTER 

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Write No. 19 on Inquiry Card



News (continued)

proposed to establish and operate the center at a cost of \$4.5 million, while MIT proposed a center cost of \$7.2 million. Harvard's proposed cost was \$7.6 million.

Write No. 420 on Inquiry Card

Zenith Supplying Z-100s to U.S. Armed Forces

Zenith Radio Corp., subsidiary will supply some 6,000 desktop microcomputers for use worldwide by the U.S. Air Force, Navy and Marine Corps over the next three years.

The stand-alone Zenith Z-100 microcomputers will be integrated with other Department of Defense computer systems. Zenith will supply the dual 16-bit and 8-bit Z-100

microcomputers in two models: one with floppy disk drives, and one with Winchester disk drives. Zenith estimates that 60 percent of the Z-100's will be equipped with Winchester drives.

Zenith's microcomputer family was selected from more than 50 brands of microcomputers, following extensive testing at Gunter Air Force Base, Huntsville, Ala., and the Computer Acquisition Center, Hanscom Air Force Base, Massachusetts.

Write No. 415 on Inquiry Card

Commodore Marketing MECC Software

Commodore Business Machines, Inc., has finalized an agreement with the Minnesota Educational Computing Consortium (MECC) which provides for conversion and

marketing of MECC software for the Commodore 64.

Under terms of the agreement, MECC will convert 100 programs from its library for use on the Commodore 64 family of computers. Programs being converted fall into the following subject areas: biology, music, earth science, social studies, math, reading, nutrition, language arts, English, spelling, and computer literacy.

MECC is an organization originally established to assist Minnesota schools and colleges in implementing computer-based learning. Over the past ten years, it has developed an expertise in the educational computing field while working with educators worldwide.

Adaptation of the MECC programs for use with the Commodore 64 will make high quality, educational software available nationwide, according to a spokesman

(continued on page 42)

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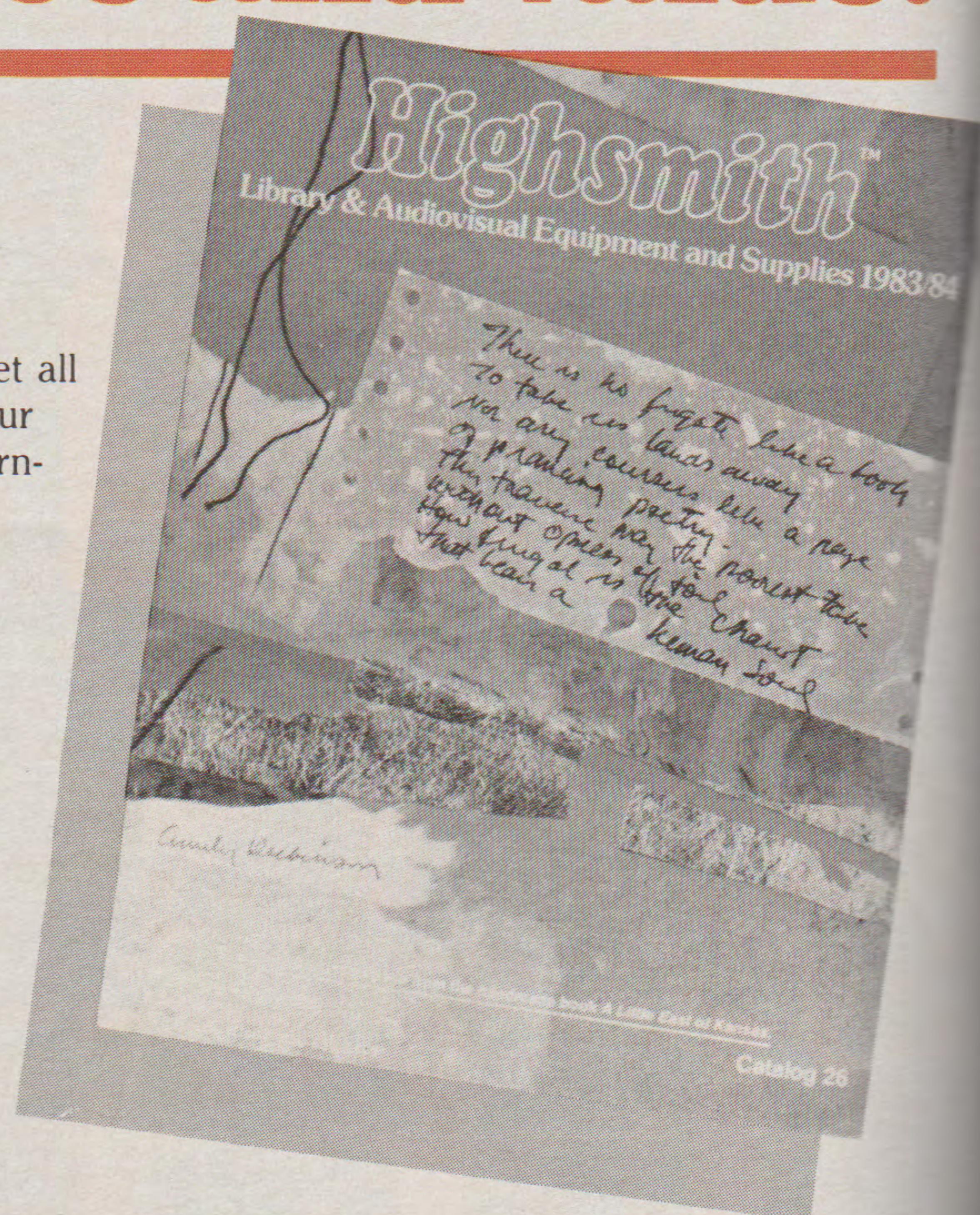
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So, instead of including the capabilities of joystick fun and games, Kaypro sticks to programs that provide serious learning opportunities for students in junior high through graduate school.

Programs included range from word processing to electronic filing; languages from Basic to P-System (available soon as an option).

To run those programs, Kaypro uses CP/M, the most common disk operating system in the world. That means the learning developed in the classroom will more than likely apply to the computers your students find outside the classroom. And to over 3000 programs written for CP/M.

Kaypro II is a completely integrated system with 64K RAM, a built-in monitor, two disk drives, built-in interfaces for a printer and communications, plus the convenience of a detachable keyboard.

After class, its portability makes Kaypro II easy to fold up and lock away. Or easy for teachers to take home for some computer homework of their own.

And while Kaypro II is not designed to destroy planets, it is designed to defend school budgets. With the available educational institutions discount, Kaypro II is the least expensive, serious computer on the market today.

To get complete details, call 800-447-4700 for your nearest Kaypro dealer. Or call the Kaypro Education Marketing Group at 619-481-4318.

Write No. 82 on Inquiry Card

TRADEMARKS: CP/M - DIGITAL RESEARCH CORP. P-SYSTEM - SOFTECH MICROSYSTEMS, INC. © 1983 KAYPRO

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News *(continued)*

for Commodore. For the first time home users of Commodore computers will be able to obtain the same software that is being used in their schools. The programs are expected to be available on floppy diskettes beginning this winter. They will be marketed by both Commodore and MECC through their regular distribution channels. **Write No. 410 on Inquiry Card**

\$100,000 Grant for Computer Science

Gulf Oil Foundation recently awarded a \$100,000 grant to Lincoln Memorial University (LMU) to provide scholarships and state-of-the-art instruction in computer science. Gulf Refining and Marketing Company representatives presented a \$20,000 check to University President Gary Burchett, the first installment of the grant to be paid over a five-year period.

In presenting the check, Ron Hall, vice president for marketing, said Gulf recognized the importance of excellence in our nation's colleges and universities in general, and the vital role of private schools in our educational system. He said that through its increased commitment of financial support, Gulf seeks to help strengthen colleges and universities both public and private.

The academic program supported by the grant currently consists of an associate degree curriculum in Computer/Information Science. The university plans to expand the curriculum to a four-year program that would offer, in addition to associate and baccalaureate degrees, academic minors for students in business, natural science, and education.

To accommodate these plans for expansion, the university recently acquired a new Digital VAX-750 computer system. In addition to serving LMU students and staff, the

computer center will also offer workshops and intensive training sessions for area residents and businesses at selected times during the year.

Write No. 427 on Inquiry Card

National Math Program Started for Junior Highs

Secretary of Education T. H. Bell announced recently the start of "Mathcounts," the first nationwide coaching program and math competition for junior high school students.

Mathcounts officially began last September in 44 states and the District of Columbia. During the next several months, millions of seventh and eighth grade students in thousands of participating schools will undergo a planned series of math skill-building exercises. This will lead to selection of school teams for a series of math competitions at the local and state levels.

The final event is a national competition in Washington, D.C., in May, 1984. Eventually, as many as 7.4 million seventh and eighth grade "mathletes" representing nearly 16,000 school districts are expected to participate.

Mathcounts is the first nationwide effort to combine resources and sponsorship of education, industry and government sectors toward improving math literacy. It will be sponsored each year by the National Society of Professional Engineers, CNA Insurance Companies, the National Aeronautics and Space Administration (NASA), the National Council of Teachers of Mathematics and the National Science Foundation.

Mathcounts has three objectives: to make math achievement as challenging, rewarding and exciting as a school sports event, and to instill this image among seventh and eighth graders; to increase public awareness of the importance of math to the country's future, and to pave the way for improvements in math

education curricula in junior high schools.

Bell marked his official announcement of Mathcounts as sample competition questions were delivered to team representatives from the Chicago, Ill., and Birmingham, Ala., public schools where prototypes of the math program have been implemented successfully.

Bell pointed to a new study, funded in part by the National Science Foundation, warning that 95 percent of the nation's children may not have sufficient math skills to function in a high-tech society. Other research indicated that half of all high school students in the United States do not study math or science beyond the 10th grade.

"We need more math and other 'back to basics' courses to assure our children a proper education," the secretary added. "America is faced with the challenge of maintaining our world leadership in technology, and it will be up to our children to carry on with this charge."

The Mathcounts program runs through the school year. Students in participating schools will take an initial math test distributed by local engineering societies. This test tells teachers where the students' current levels of math competency are and what areas need to be strengthened.

Write No. 407 on Inquiry Card

Programs Developed for IVIS Options

Three programs to help customers develop and implement applications using the Interactive Video Information System (IVIS) option were announced recently by Digital Equipment Corp.

Programs in consulting services, custom course development, and courseware acquisitions will combine with IVIS hardware and authoring tools to provide training solutions, according to spokesmen for Digital.

(continued on page 43)

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Write No. 99 on Inquiry Card

News *(continued)*

Digital's Educational Services Group will provide consulting services related to IVIS courseware development and training applications. These services are designed to help minimize the time and expense for customers to develop IVIS courseware, and to improve the awareness of customers who require systems-based solutions to training problems.

Consulting services will aid courseware developers in the use of: preliminary courseware authoring tools and future, advanced authoring systems; IVIS course development programming; video production techniques and requirements; and the establishment and evolution of customer training departments and programs.

The Educational Services Group's activity in designing and presenting on-site courses for customer training will be expanded to include custom IVIS courseware development for large customers, according to Digital spokesmen. Teams from both Educational Services and the customer's staff will cooperate on specific projects to reduce time for implementation.

The Courseware Acquisitions program is intended to make available a volume of generic courseware in markets where there is a demonstrable need. Such a courseware library will expand the application areas for IVIS systems. It will also enable implementation of IVIS-based instruction for customers without the resources to develop their own courseware.

Write No. 426 on Inquiry Card

ITFS Expanded at Illinois University

Mechanical and chemical engineers in the greater Chicago area who are interested in pursuing advanced degrees or in keeping up with the rapid advancements in their fields will be able to do so

this fall without going to school. The classes will come to them.

Illinois Institute of Technology (IIT), a private university on Chicago's South Side, has extended its four-channel Instructional Television Fixed Service (ITFS) system with three additional transmitters to meet the increasing demands for expanded programming.

The ITFS system is a two-way interactive system which allows a teacher in a central location to broadcast to and converse with thousands of students in other locations.

IIT received its new transmitters from the EMCEE Broadcast Product Division of Electronics, Missiles & Communications, Inc.

The university's ITFS system, which has been in operation since 1976, currently offers graduate programs in business administration, computer science and electrical engineering. The system reaches 24 receiving sites, primarily high technology companies, such as Bell Labs/Western Electric, GTE Automatic Electric and Honeywell, Inc. The service also includes three public receiving sites in Illinois: New Trier East High School in Winnetka, New Trier West High School in Northfield and North Central College in Naperville. The transmitters are located atop the Sears tower, providing a radius of 40 miles.

Write No. 430 on Inquiry Card

College Outlines Become Courseware

Intellectual Software of Bridgeport, Conn., will develop educational software based on 19 books in Simon and Schuster's Monarch College Outline Series under an agreement recently signed by the two companies.

The books that will be converted into courseware are: Western Civilization I and II, Statistics, Introduction to Accounting, Chemistry, American History I and II, Economics, Spanish Grammar, Introduction to

Philosophy, Introduction to Music, Introductory French, English Literature I and II, Art History, American Literature, American Government, and Freshman English I and II.

The company will develop and market packages for use on Apple, IBM, TRS-80 and Commodore 64 computers.

Write No. 430 on Inquiry Card

Apple Program Gives Special Pricing to Schools

Apple Computer recently announced a special pricing program for schools that allows a school to purchase Apple products at 30 percent off suggested retail prices. In addition, for every five of the same product purchased, Apple will contribute a sixth identical product free of charge.

The program, which Apple calls "Investment in Education," began last November and continues until February 28. It is available to all U.S. public and private schools, from elementary through college levels.

"Educators are placing high priority on increasing the number of computers in their classrooms so that every student has the opportunity to become computer literate," said Chris Bowman, education marketing manager for Apple.

"Apple is sensitive to the limited resources schools have to purchase computers and software, so we've designed a program that provides the best possible value for their investment."

The program covers most Apple hardware and software products except the Lisa personal computer and software. Systems such as the Apple IIe Starter System and special promotional packages are available at the discounted price but are not included in the six for five offer.

Both new customers and schools that currently have purchase agreements with Apple can participate in the program.

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IBM has been in the 11th grade for 20 years.

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There is a wide variety of software for IBM computers. Software that works. To pick one of many examples, Proviso High School District, in Maywood, IL, cut failure rates by 30% with a mathematics program emphasizing drill and practice.

And we can help you keep your system up and running. Maintenance, after all, accounts for a large part of what most school systems spend on computers, and IBM leads the industry in service and support.

Computers help make drill and practice more efficient; they let students work at their own pace; they help teach crucial keyboarding skills; and they ease the drudgery of marking tests and keeping records up to date.

But one of the most important things that IBM has learned in schools is that computers give teachers time to teach.



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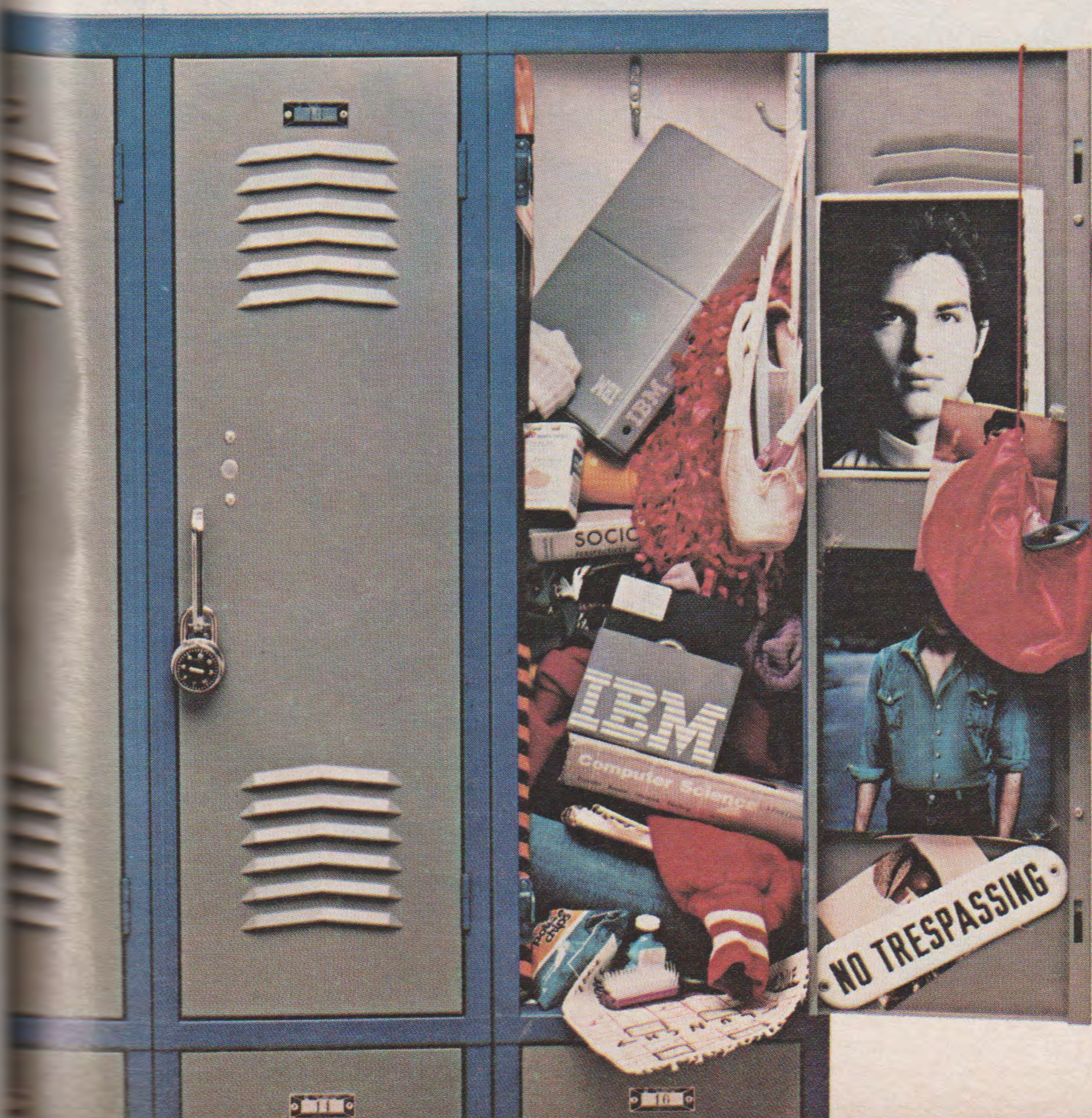
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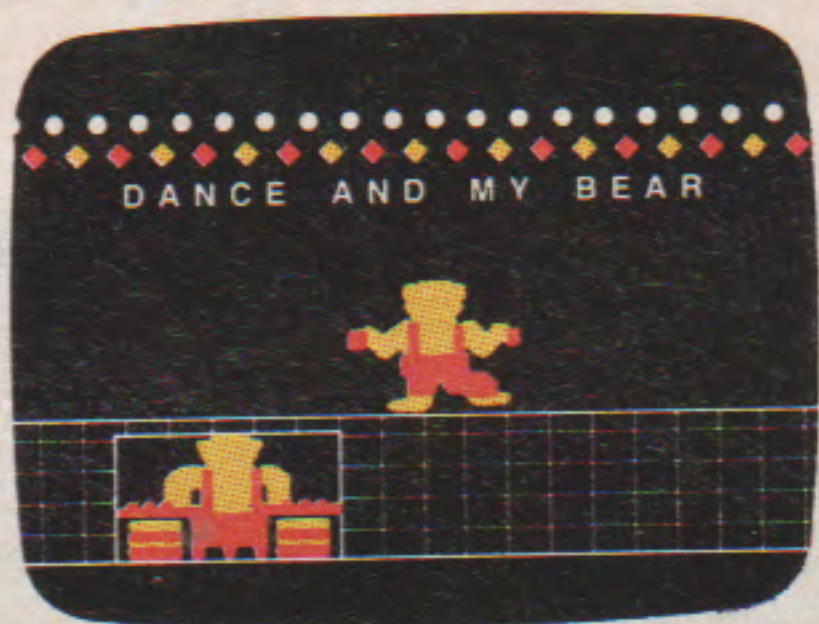


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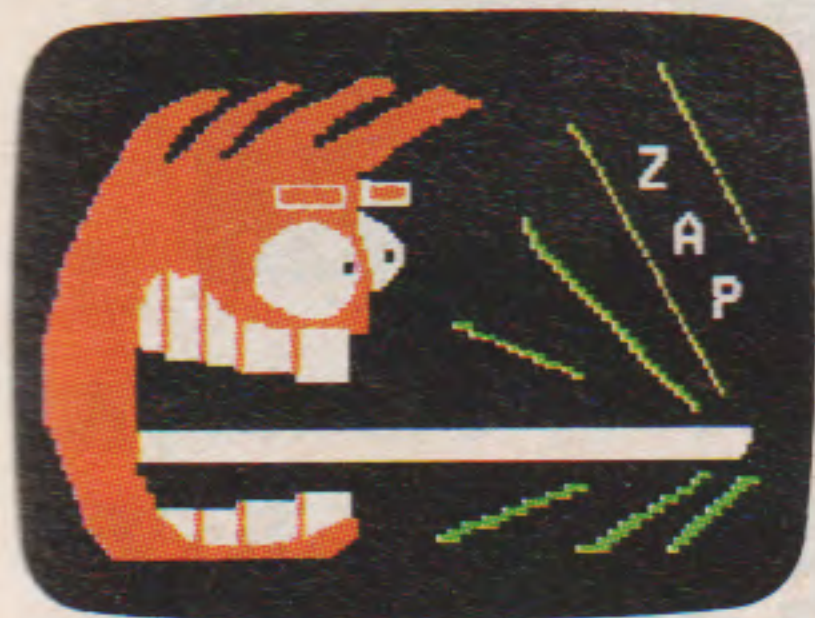
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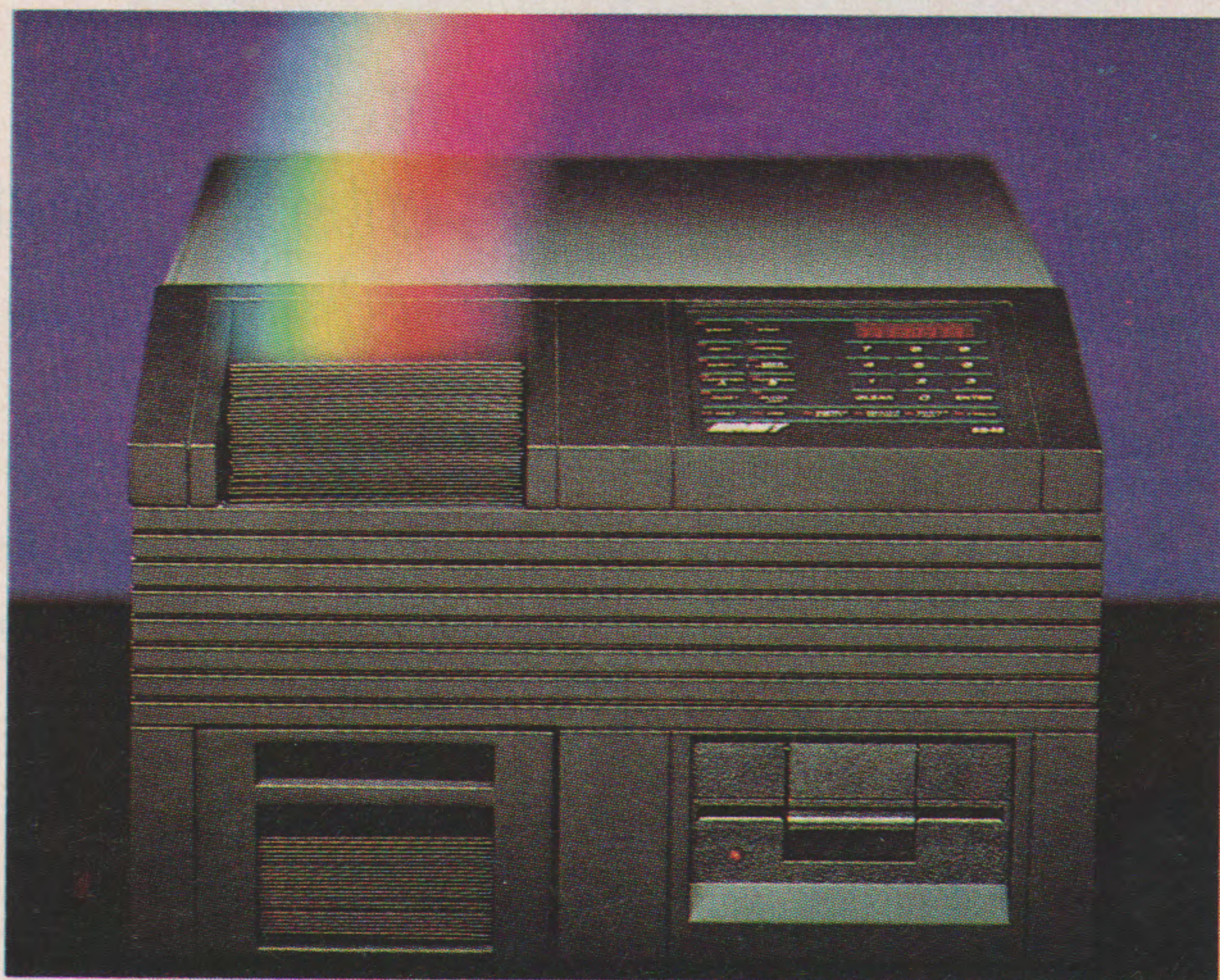


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*Software included with Touch Tablet varies with computer type.

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Media Systems Technology, Inc.

Write No. 83 on Inquiry Card

New Publications

Catalog Features Meeting Materials

A 40-page catalog of products and services has been published by Visual Horizons.

The catalog features new products available, such as attention-getting slides, slide projectors, slide masks, and an entire range of audio/visual systems.



SLIDE SHOWS FEATURED

Also included in the catalog is a feature article on how to produce slide shows entitled "Slide Shows Made Easy."

A full-color slide of the date, "1984," will be sent with request of the catalog. *Visual Horizons, Rochester, NY.*

Write No. 521 on Inquiry Card

Additions to Dynacomp Software

Dynacomp's Winter 1983 Computer Software Catalog includes several new additions to the company's software line. The 112-page catalog is free to anyone who requests it.

Some of the additions to the winter catalog are: "Waterloo 1815," a one-player simulation of the Battle of Waterloo for Atari computers; "Star Con," a computer board game in which the objective is to conquer 20 planets that exist on a star map; "Compu-opoly," a computerized

board game with rules similar to "Monopoly" for the TRS-80; "Celestial Basic," 23 programs on two diskettes that provide amateur astronomers and students with aids to observing and understanding the motions, apparitions and configurations of the stars and planets (for Apple computers), and "Buy Low - Sell High," a stock market and investment simulation for up to three investors for the TRS-80. *Dynacomp, Inc., Rochester, NY.*

Write No. 503 on Inquiry Card

Computer Resources for the Classroom

The Computer Skill Builders' 1984 catalog of microcomputer resources for the classroom is now available. The catalog contains 321 computer-related products for education from 52 publishers, including 141 software programs, 180 books, and various computer classroom supplies.

Featured products include: Computer Skill Builders' LOGO Task Cards, LOGO Visual Masters, PASCAL Task Cards, and PLATO courseware by Control Data Corp.

The catalog is available free of charge. *Computer Skill Builders, Tucson, AZ.*

Write No. 501 on Inquiry Card

Catalog Lists 400 Software Programs

The 1983-84 edition of the Microcomputer Instructional Materials Catalog includes more than 400 teacher-tested and scholastic-approved computer software programs. The programs are distributed to schools by Scholastic and backed by Scholastic's 30-day evaluation guarantee.

The programs are categorized by grade level (from kindergarten through 12). Subjects include: language arts, reading, math, social studies, life skills, career guidance, science and the humanities.

Software is offered in the catalog for a variety of computers, including

Apple, Commodore 64, Commodore Pet, Commodore VIC-20, the TRS-80 Model III, Texas Instruments, Atari and the IBM PC.

Scholastic plans to publish winter and spring supplements to the microcomputer catalog. *Scholastic, Inc., New York, NY.*

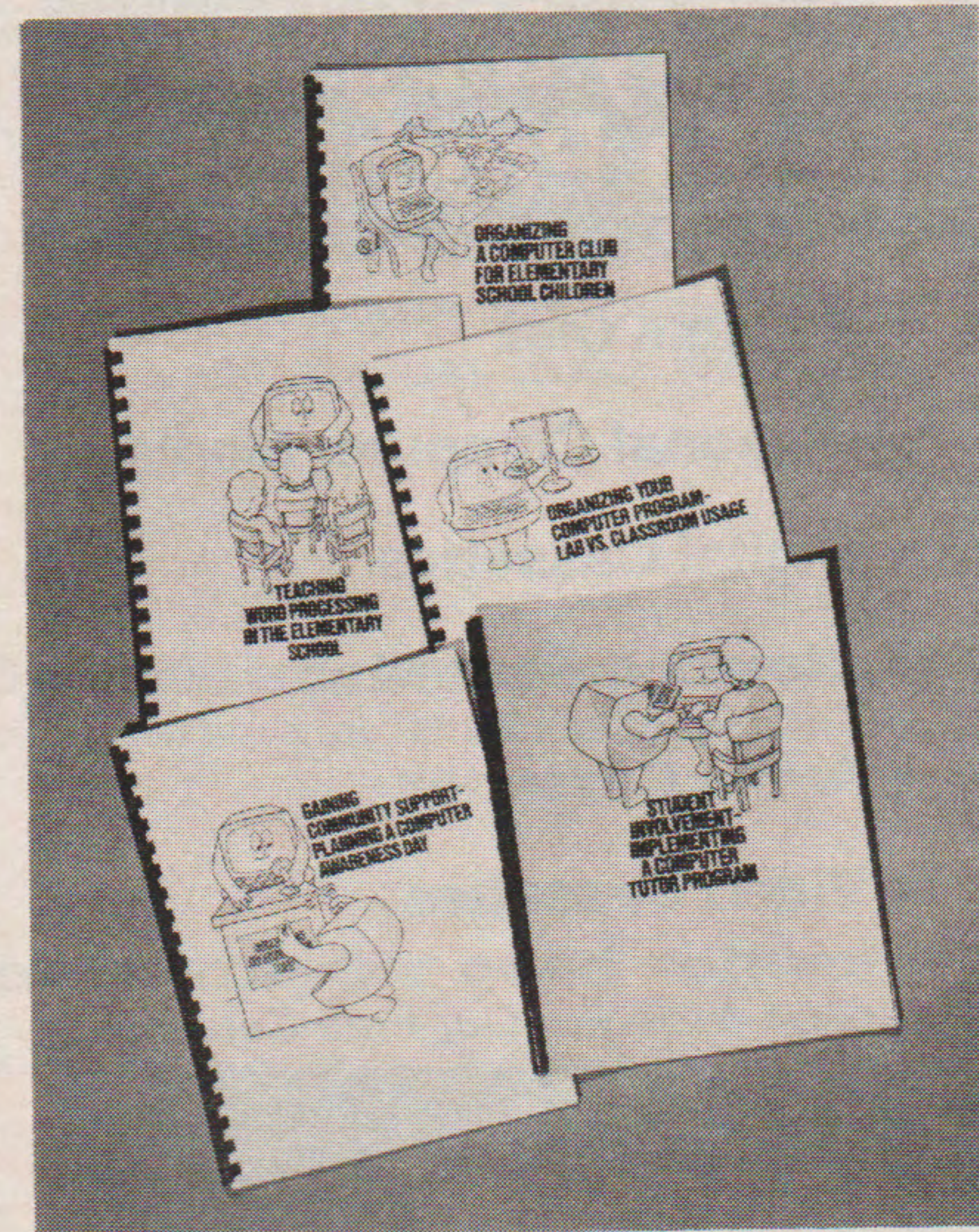
Write No. 512 on Inquiry Card

Organizing for Computer Activities

Computer Directions for Schools has published manuals to assist staffs in the planning, organization and implementation of various computer-related activities at their schools.

The manuals were written primarily with the elementary school in mind. However, many of the ideas can be adapted at the junior high level.

Current titles include: "Organizing a Computer Club for Elementary School Children," "Student Involvement — Implementing a Computer Tutor Program," "Gaining Community Support — Planning a Computer Awareness Day," "Teaching Word Processing in the Elementary



SCHOOL COMPUTER ACTIVITIES

School," and "Organizing Your Computer Program — Lab vs. Classroom Usage." *Computer Directions for Schools, Livermore, CA.*

Write No. 502 on Inquiry Card

(continued on page 50)

Publications (continued)

Guidebook for Data Communications

A 40-page Data Communications Casebook from Digital Equipment Corp., is a primer in modem use and Digital's intelligent communication processor.

The authors have made "mysteries" of computer and modem usage and then "solved" them with various applications. The four-color guidebook is elaborately illustrated and presents an entertaining approach to solving problems in data communications.

Digital's line of modems, acoustic couplers and intelligent communication processors are featured and are described in detail in the closing section of the guidebook.

The book proceeds from examples of simple data communication prob-

lems to the more complex, describing a typical situation and how it may be solved. Examples and definitions help the newcomer to understand communication options available in a variety of situations. Requests for a free copy of Digital's Guide to Data Communications should be sent on company letterhead. *Digital Equipment Corp., Merrimack, NH.*

Write No. 505 on Inquiry Card

Computerized Pupil Transportation

A four-page fold-out brochure by Education Logistics, Inc., explains the Edulog approach to pupil transportation and school administration.

Software featured in the brochure includes: Student Census, which provides a district-wide data base of student demographic information; Geographic Enrollment Analysis, which generates information for school boundary planning; Student Attendance; Grade Reporting; Class Scheduling; Financial Accounting; Personnel/Payroll; Assets Inventory; Bus Fleet Maintenance, and Word Processing.

The software is interactive and on-line. It includes a student data base update, with automatic bus stop assignment, and bus stops and bus runs added, deleted and reassigned. Programs for special education provide for individualized care by taking into account such factors as handicap type, special equipment, aide assistance, maximal riding time and home pick-up. *Education Logistics, Inc., Missoula, MT.*

Write No. 514 on Inquiry Card

Static-Conductive Vinyl Flooring

An eight-page color catalog describing Conductile static-conductive vinyl flooring has been published by VPI.

The catalog discusses proper uses and applications for Conductile, as well as the properties of the static-

conductive flooring. Specifications, installation and maintenance information are included. Conductile



CONDUCTILE CATALOG

was developed by VPI in 1950 to help solve the problem of electrostatic discharge in electronics manufacturing, assembly and testing areas, computer rooms, electronic equipment installations, clean rooms, hospitals, and other areas where a static-free environment is necessary.

Free copies are available. *Conductile Catalog, VPI, Sheboygan, WI.*

Write No. 504 on Inquiry Card

Brochure Features Computers, Supplies

A four-page brochure from Butler Associates describes various computers, peripherals and supplies for the company markets.

Featured in the brochure is the Avatar, which offers IBM PC and CP/M compatibility, and the Sumicom 300, which links and integrates word processing, financial planning, data base management, graphics, communications, and accounting into one software system.

Other microcomputers, terminal printers, modems, and Winchester drives are listed and pictured in the brochure, including the Siemens PR-88 ink jet printer and the Visual 500/550 graphics terminal. *Butler Associates, Newton Highlands, MA.*

Write No. 508 on Inquiry Card

(continued on page 52)

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Shelton, CT 06484 • (203) 735-6477

Write No. 26 on Inquiry Card

"Good" Educational Software for the Apple?

COMPRESS has it!

Many educators bemoan the fact that there are hundreds of educational packages coming on the market—often lacking author names or credentials. Nearly every COMPRESS author is a teacher or professor involved daily with students using Computer Assisted Instruction on the Apple computer.

COMPRESS courseware runs on the Apple II plus®, IIe®, Bell & Howell or Franklin computers with at least 48K memory and 3.3 DOS.

NEW for 1984!

Statistics and Probability Demonstrations and Tutorials

by Bruce E. Trumbo, *California State University, Hayward*

Illustrates concepts through the use of outstanding color graphics, practical problems, and simulations. Useful for both classroom demonstrations and self-study. Complete series includes six programs:

1. Chi-Square Analysis of Contingency Tables (with Tutorials)—one diskette
2. Discrete Probability—Part 1, Shapes of Well-Known Distributions (with Tutorials)—two diskettes
3. Discrete Probability—Part 2, Simulations, Limit Theorems, and Distribution Functions—one diskette

These three programs are available now. Other programs planned for the series will include One-Way Analysis of Variance; Graphical Approaches to Multivariate Data Analysis; and Continuous Probability Distributions.

Complete Series—Six Programs \$400.00. Individual Program Units are \$75.00 each, including all documentation.

A Demonstration Disk for Programs 1-3 is now available.



COMPRESS A Division of Van Nostrand Reinhold Co., Inc.
P.O. Box 102 Wentworth, NH 03282 (603) 764-5225/5831
®Registered trademarks of Apple Computer Company

The programs they produce use animations, graphics—often with color, and the latest instructional techniques.

Whether it's an educational game, an authoring language, classroom demonstration material, or a more traditional student "hands on" CAI package, you can count on one thing from COMPRESS—it works!

And that's "good".

If you have authored any courseware materials, we welcome the opportunity to discuss them with you.

Call us now and request our catalog and demonstration diskettes, or return the coupon below.

I'm looking for good software!

☐ Send me your Statistics and Probability Demonstration Disk.

☐ Send me your catalog.

Name _____

School _____

Address _____

City/State/Zip _____

Telephone _____

Write No. 110 on Inquiry Card

Publications (continued)

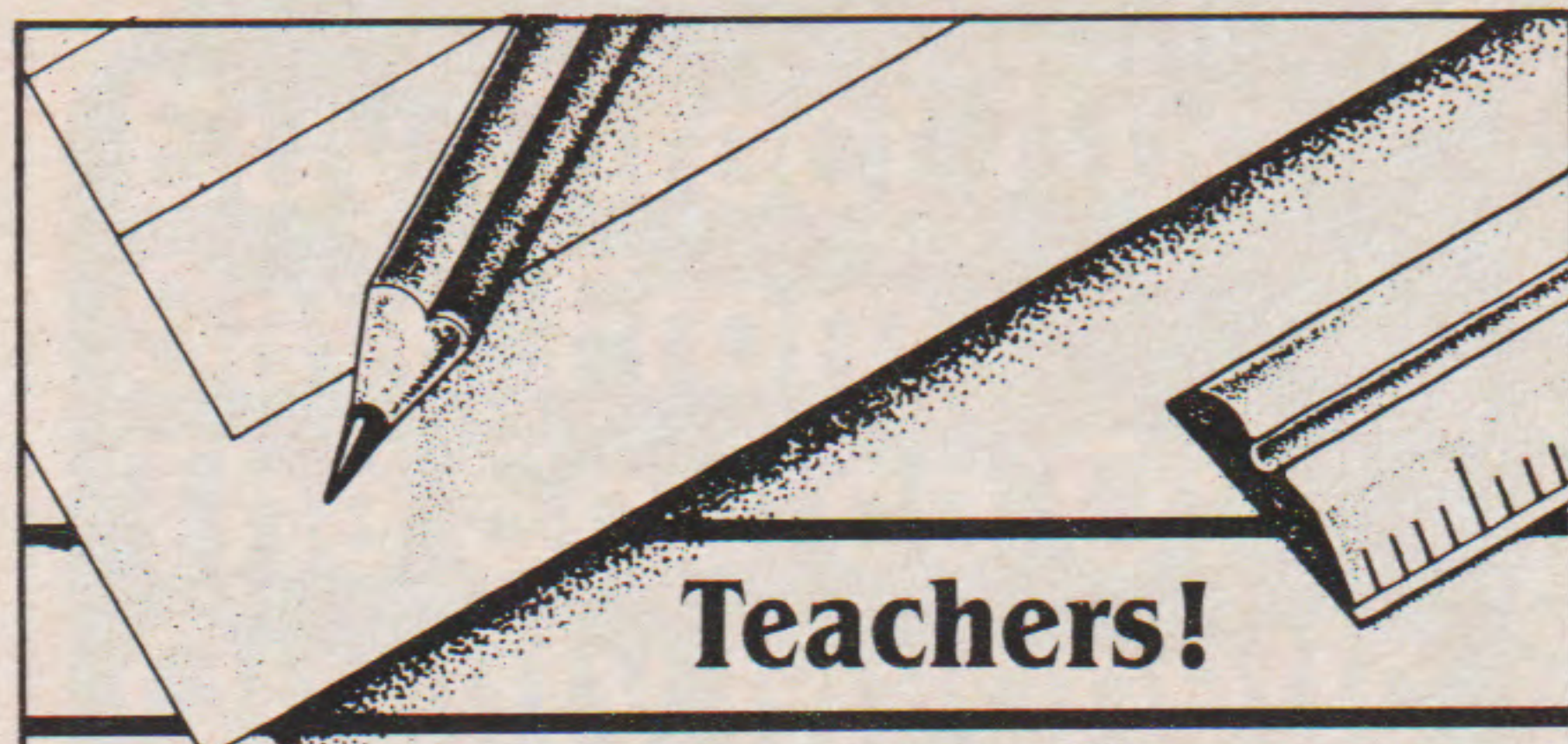
Optical Mark Reader Featured

The Sentry 3000 Optical Mark Reader is described in a four-color, four-page brochure.

A terminal scanner for distributed and network applications, the Sentry 3000 translates pencil marks on forms into computer useable information. The Sentry 3000 reads both sides of a document simultaneously at speeds up to 600 sheets per hour. Data is then transmitted to a host computer either locally or via remote communications.

Scanning eliminates the need to transfer data from handwritten source documents by conventional keying operations.

The brochure includes a diagram of the 3000's data gathering networks. Other features noted include:



Grading just got easier.

Now you, too, can "make the grade" with computers. Use the Report Card program from Sensible Software to save time and avoid mistakes preparing your grades. Even novices can learn to use the Report Card program quickly. It can:

- track up to 300 students on one diskette
- hold up to 40 students per class and 50 activities per student
- correctly handle "incompletes"
- calculate student and class averages
- rank students with various printing and sorting options
- easily make corrections and remove incompletes with its built-in editor

Report Card includes software, reference manual and easy-to-use tutorial with special instructions for first-time users. Report Card works on Apple computers and is available for \$59.95.

Sensible Software, Inc.

6619 Perham Drive
W. Bloomfield, MI 48033
(313) 399-8877

Now, IBM PC!

Write No. 58 on Inquiry Card

forms flexibility — information on a 3000 form can appear in any location and configuration; hardware modularity — the unit can be upgraded to include an automatic-feed mechanism and an on-form transport printer; diagnostics, and stand-alone test scoring. *National Computer Systems, Minneapolis, MN.*

Write No. 518 on Inquiry Card

Computer Literacy Interactive Video

Details of an interactive video-based program for training teachers in computer literacy are given in a four-page color brochure available from Computer Literacy Ltd.

Designed in association with the Los Angeles Unified School District specifically for schools having only one or two microcomputers, the "Computer Time Resource Package" described in the brochure consists of three 30-minute video-cassettes, a 112-page manual, and two tutorial diskettes compatible with Apple II, TRS-80 and IBM PC microcomputers.

Also contained within the course are three software programs which can be used for classroom management, the generation of tests, and the creation of tutorial drills.

According to the producers, the interactive video set can be used by private schools, public school districts, two-year colleges, and universities that grant educational degrees. *Computer Literacy Ltd., North Hollywood, CA.*

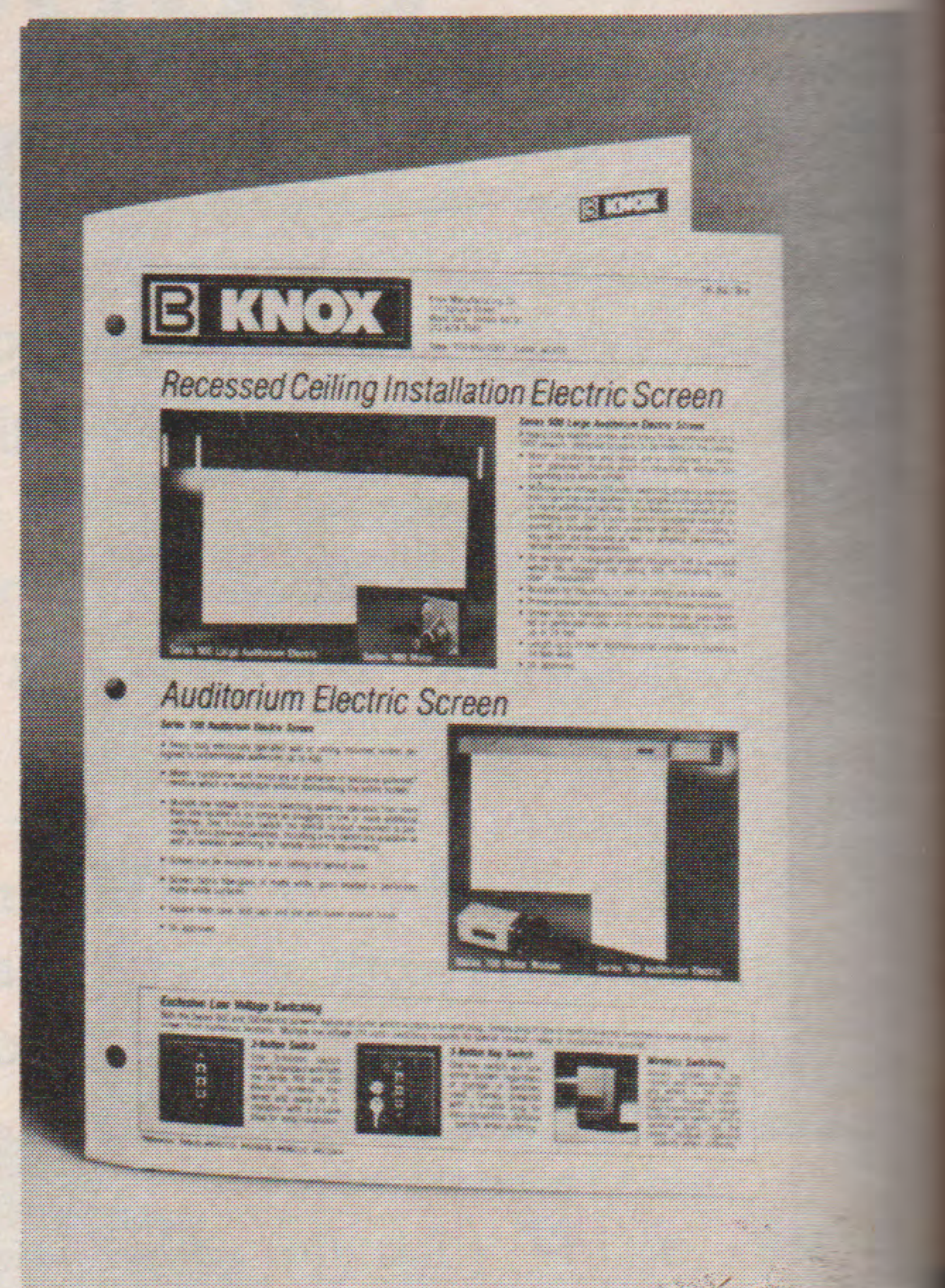
Write No. 525 on Inquiry Card

Catalog Insert on A/V Equipment

A four-page catalog insert from Knox Manufacturing provides specifications and prices for screens and other audio/visual equipment.

Tripod projection screens, wall or ceiling mounted screens, and electric screens are included in the new listing, as are the Knox Universal Projection Cart, Acculight viewing

systems for slides and negatives, and modular storage units which fit the Acculight viewers.



CURRENT PRICES, SPECS

In addition to specifications and prices for specific Knox products the insert includes charts to help customers determine the right screen size and fabric for their specific needs. *Knox Manufacturing, Wood Dale, IL.*

Write No. 513 on Inquiry Card

Catalog on Human, Education Services

The School and Human Services Catalog for 1984 is available from Learning Publications, Inc.

Educational services listed in the catalog include: microcomputing administration, multilingual, language arts, career education, and special education. Human services listed include: child abuse, alcoholism, incest, domestic violence, rape, and treatment.

Titles listed in the microcomputing section include: "Microcomputers in Education: A Nontechnical Guide to Instruction and School Management Applications;" the "School Microcomputing Bulletin" written by educators who test and evaluate products in school settings published monthly ten times a year.

(continued on page 55)

Enjoy a world of learning and leisure with the Sakata Model SC-100 Color CRT Monitor

Model SC-100 accepts a composite video signal; has a modern streamlined design; includes an audio speaker and an earphone jack for privacy of operation and is compatible with fine popular personal computers.

Your SAKATA monitor will enhance your picture comparable to the most expensive computers available.

Improve your education and increase your fun with SAKATA CRT DISPLAY MONITORS . . . "We Promise Performance",...

Also available: Model SC-200 13" RGB high

resolution COLOR CRT MONITOR. Model SC-300 13" RGB super high resolution COLOR CRT MONITOR. Model SG-1000 12" monochrome high resolution CRT MONITOR (green). Model SA-1000 12" monochrome high resolution CRT MONITOR (amber).

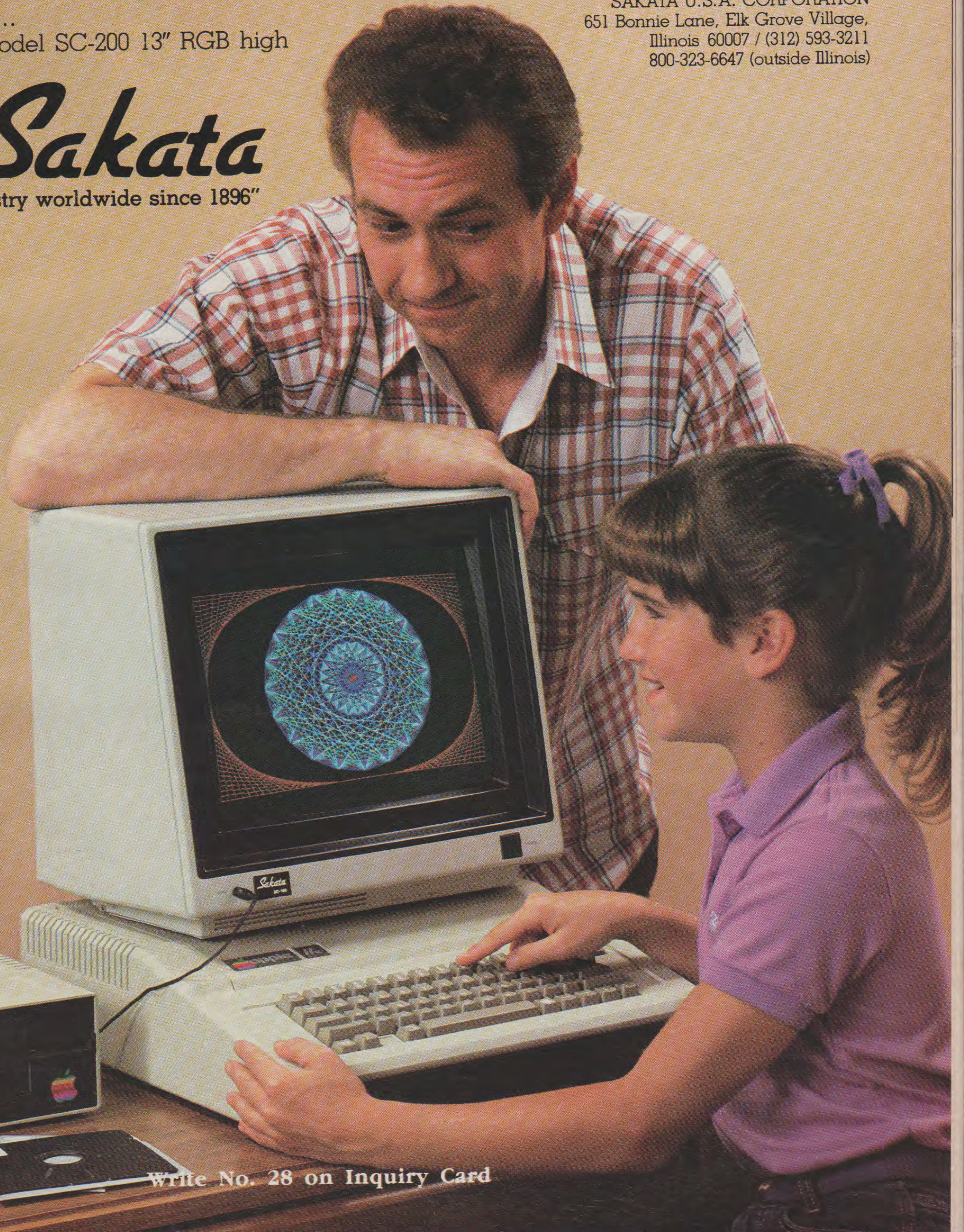
SAKATA CRT MONITORS are available wherever personal computers are sold or write for technical and illustrated literature and prices.

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Illustrated:
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COMPOSITE COLOR
DISPLAY MONITOR



Write No. 28 on Inquiry Card

National Conference on Technology and Education

Sponsored by:
The University of Texas at Austin
College of Education and
Tandy Corporation/Radio Shack
Education Division

Discover the impact of new technologies on the classroom.

The National Conference on Technology and Education will be held April 19-20 in Fort Worth, Texas. The two-day conference is co-sponsored by the University of Texas at Austin College of Education and Tandy Corporation/Radio Shack Education Division. The conference will offer educational decision makers a forum to explore applications of computer technology as well as the potential benefits and problems of computer usage in education. Featured keynote speakers, breakout sessions dealing with topical issues, as well as demonstrations of

present technology will provide the most current information for concerned educators.

Explore the ways in which educators can effectively prepare today's schools and youth for the information age.

Participants can attend sessions focusing on educational courseware, classroom networking, hardware and software purchasing considerations, computer curriculum planning, administrative courseware and teacher training. Educators will be able to select from these topics of interest and many more. An exhibit area will also be open each day to give participants "hands-on" demonstrations.

Receive credit for your efforts.

To those who request it, a Continuing Education Credit Unit of 2.0 hours will be granted by the University of Texas College of Education upon completion of the conference. Those who wish, and whose districts approve, may receive "inservice training credits" for attendance. (An additional fee is required to receive CEUs.)

Take advantage of this unique opportunity.

Plan to attend the National Conference on Technology and Education. Registration fee is \$95. Attendance is limited, so send for a registration form today.

To receive more information and registration materials, mail this completed form to:

The University of Texas at Austin, College of Education,
Continuing Education Program, EDB 374, Austin, Texas 78712
Write No. 22 on Inquiry Card

NAME _____ ADDRESS _____ CITY _____ STATE _____ ZIP _____
SCHOOL/ORGANIZATION _____ POSITION _____ TELEPHONE _____

Publications (continued)

"Teaching BASIC: Thirty Lesson Plans, Activities and Quizzes," "Student Guides for Learning BASIC," and "Educators, Parents and Micros: How to Help Your School Get and Use Computer Power." *Learning Publications, Inc., Holmes Beach, FL.*

Write No. 524 on Inquiry Card

Brochure Describes the Micro-Editor

A four-page brochure released by South-Western Publishing Co., features the Micro-Editor.

According to the publishers, the Micro-Editor will teach students the basic techniques of text editing in five hours. The material is presented in step-by-step lessons and is available for the TRS-80 and Apple II+ microcomputers.

The Micro-Editor is designed to be used in several classes, including those dealing with word processing, office procedures, typewriting, shorthand, secretarial procedures and data processing. *South-Western Publishing Co., Cincinnati, OH.*

Write No. 522 on Inquiry Card

School Management System Brochure

The School Management System (SMS) is featured in the Computer Resources & Technology (CRT) Software Systems brochure.

The SMS is a comprehensive software package designed for in-house data processing on the IBM System 34 or 36 computer. The system has two major components — fund accounting/payroll and student administration. They can be operated independently of each other, or as an integrated system. The SMS was designed by CRT, Inc.,

in conjunction with school districts to meet the data processing needs of schools.

Listed as benefits of in-house data processing are: better use of time and operations; ease of use; reporting, and cost justification.

Highlights of the SMS include fund accounting, payroll, student administration, and additional school management products. *Computer Resources and Technology, Inc., Waukesha, WI.*

Write No. 516 on Inquiry Card

Communications Technology Quarterly

"Tymshare Today," a review of information and communication technology and applications, is published quarterly by Tymshare, Inc.

A full-color 26-page magazine, "Tymshare Today" includes various features and news items and summaries.

Speed up computer input, and improve data accuracy with a dependable HEI card reader. Reads pen or pencil marks, and works with Apple II and other microcomputer systems. Self-adjusting and accurate.

The Model 121-4 is supported by software which has been written and tested by educators. Programs include:

- Comprehensive monitoring of achievement
- Attendance recording and reporting
- Mastery management
- Test scoring and reporting
- Grading, analysis and record-keeping

EDUCATIONAL CARD READER

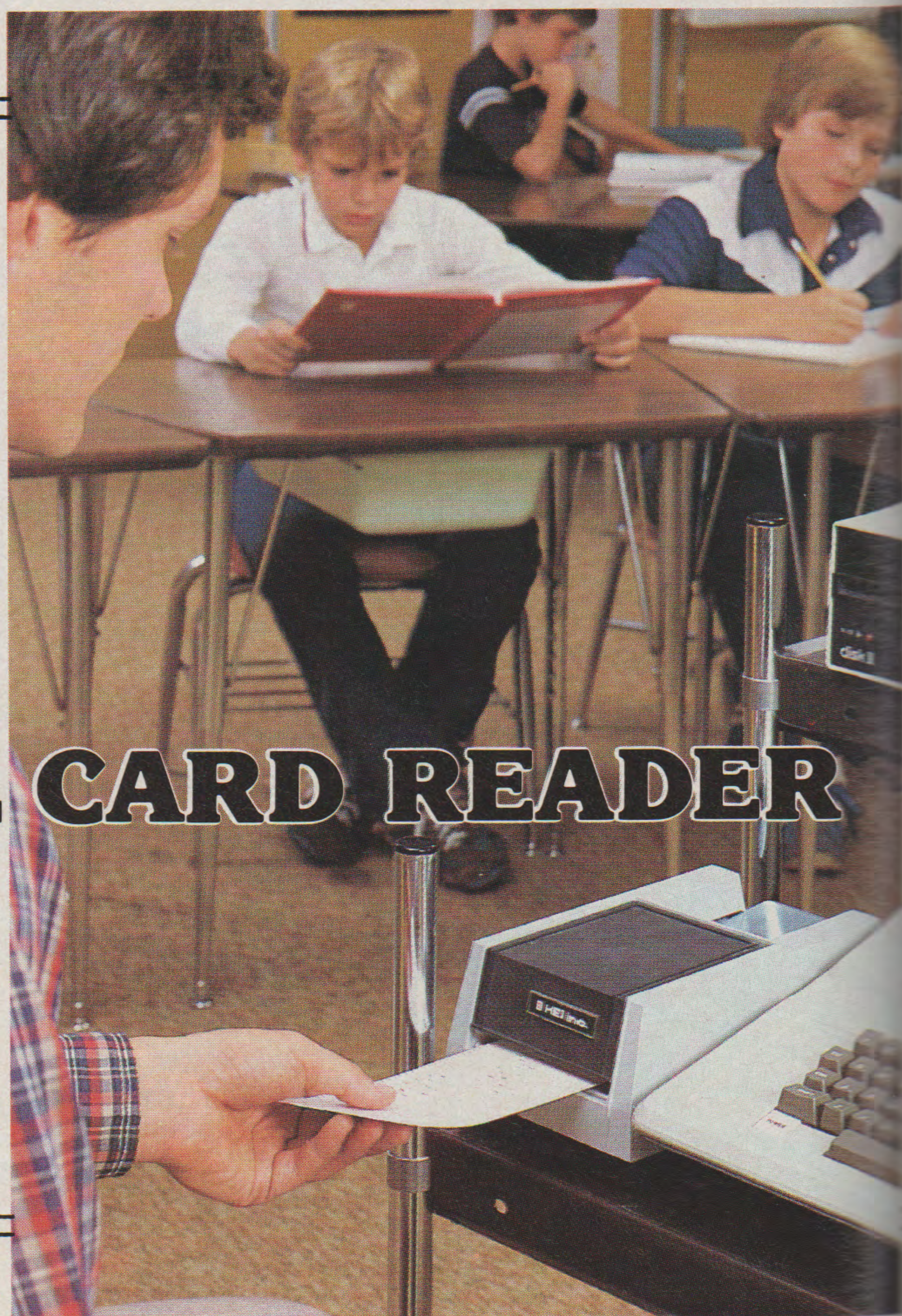
SPECIAL

Free HEI-Score grading software, or Apple Super Serial card for \$35.00 with purchase of HEI 121-4 Reader. Valid till 6/84.

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Write No. 88 on Inquiry Card



maries of Tymshare's ideas, products and services.

A recent issue of the magazine included articles such as: "Accountants Work Smarter with MICRO-TYM," "Management Reporting Module from CPA," "Tymnet Telephone Access in 150 More Cities," "Unitax Brings Tax Processing to the Eastern Seaboard," and another good idea from TeleCheck's Robert Baer. *Tymshare, Inc., Cupertino, CA.* Write No. 509 on Inquiry Card

Newsletter Features Children, Computers

"MicroNotes on Children and Computers," a bi-monthly newsletter by ERIC/EECE, is now in its third issue.

The newsletter brings together information on computers from a variety of sources — journals, research publications, conference presentations and the popular press. It is aimed at both children and adults.

Included in the four-to-six-page newsletter are stories on computer use in schools, descriptions of computer courses, excerpts from magazines and journals, descriptions of software, and a listing of conferences. A subscription to the newsletter, published six times a year, is \$8 in the U.S.; \$10 in other countries. *ERIC/EECE, College of Education, Urbana, IL.*

Write No. 506 on Inquiry Card

Brochure On Sentry PLUS

A four-page four-color brochure on the Sentry PLUS Optical Mark Reading Computer System is available from National Computer Systems.

An integrated, scanner-based microcomputer system, the Sentry PLUS combines the NCS Sentry 3000 scanner (or any other Sentry tabletop scanner) with the IBM PC.

Benefits of the Sentry PLUS described in the brochure include:

single vendor support; a network of Sentry PLUS users, allowing communication through newsletters and user groups; two printing plants devoted to printing NCS scannable forms, and availability of software compatible with IBM PC for the Sentry PLUS system. *National Computer Systems, Minneapolis, MN.*

Write No. 517 on Inquiry Card

Brochure Features ESL/EFL Software

A four-page brochure published by Regents/ALA Company features software for teaching English as a second or foreign language (ESL/EFL).

The software is a result of a joint venture of the American Language Academy and Regents Publishing Co. They have produced three basic course packages at the beginning, low intermediate and intermediate levels, along with supplementary course management materials for these courses.

Featured are: Vocabulary Master (Series A); Grammar Mastery (Series B and C); the Teachers' Management Program, and selections from the CAI ESL series. *Regents/ALA Company, New York, NY.*

Write No. 511 on Inquiry Card

Courseware for Accounting Classes

"Microcomputer Oriented Accounting: A CAI Approach" is featured in a four-page brochure. The courseware consists of a text-workbook and program diskettes designed to introduce students to the microcomputer while teaching them basic accounting principles.

Students can call upon diskette programs to journalize transactions; to automatically post to the general ledger; to prepare trial balances, and to computerize work sheets, bank reconciliations, payrolls, and depreciation schedules for plant assets.

The course is designed to teach

basic accounting theory. It leaves the work of accounting to the computer so the students can concentrate on the theory.

The diskettes can be used on a TRS-80 I, Level II, with BASIC and 32 Kb memory; a TRS-80 Model II, with BASIC and 32 Kb memory, or an Apple II+ with Applesoft BASIC, DOS 3.2 and 32 Kb of memory. *South-Western Publishing Co., Cincinnati, OH.*

Write No. 523 on Inquiry Card

Catalog Features Courseware

Opportunities for Learning has published the 1983-84 edition of "Selected Microcomputer Software." The catalog features educational courseware in mathematics, science, language arts, computer programming and literacy, simulations, teacher and administrator utilities, (continued on page 58)

Aquarius

All Learning Levels

Specialists in:

- ★ Special Education
- ★ Early Learning
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Write No. 17 on Inquiry Card

FLIP-IT^{works!}

by D/PunchTM

running out of diskettes?
how many floppies do you have?
only listen to records on one side?
only play tapes on one side?

Turn Your FLOPPIES Into FLIPPIES

Now you can easily convert your single-sided Floppies into Flippies (diskettes) using FLIP-IT's pat. pend., clumsyproof, leeryproof, conversion Kits. Works with single, double or quad density — hard or soft sector. With FLIP-IT, there is:



8" FLIP-IT

NO NEED TO:

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2. Make alignment marks.
3. Take media out of jacket.
4. Alter your hardware.
5. Buy additional software.

GREAT FOR:

1. Saving storage space
2. Increasing memory
3. Making backup copies
4. Saving money
5. Fun to do



5 1/4" FLIP-IT

STOP WASTING HALF YOUR MONEY & MEMORY

"FLIP-IT was very easy to use... converted... four boxes of diskettes in less than one half hour... Used other side... No Problems."

John DeMeritt, Belmont, MA

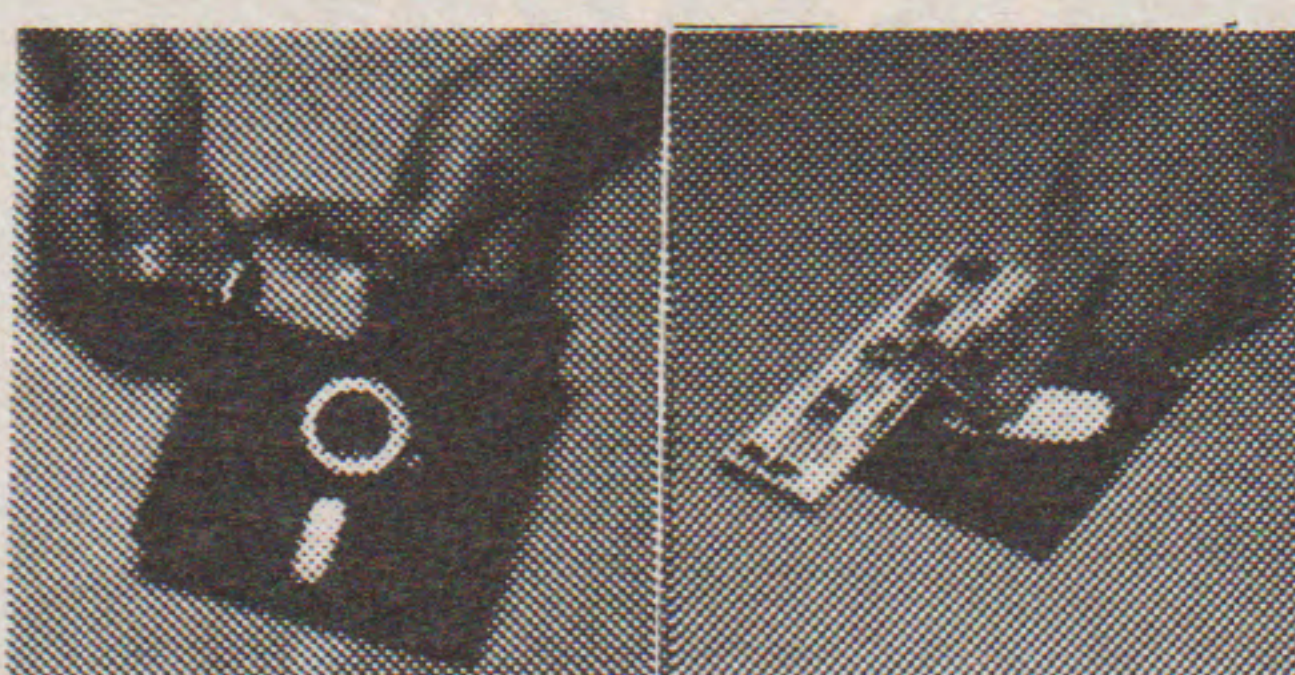
Why should your single-sided diskettes be readable and writeable only to one side? THESE TIMES DEMAND THAT EVERY DOLLAR YOU SPEND HAVE THE POWER OF TWO

- a) 5 1/4" FLIP-IT: for all 5 1/4" computers incl. Apple, IBM, Osborne, Atari, Radio Shack, Commodore, Victor, Kaypro, Franklin & more only \$29.95
- b) 8" FLIP-IT: for 8" computers incl. IBM, Wang, Altos, Radio Shack, DEC, DG & more only \$34.95
- c) Labels: (self-sticking, 100 ea.) only \$3.00
- d) Write Protect/Enable Tabs: (100 ea.) \$2.65
- e) Hub-Reinforcer Kit: (positioning tool for hub-opening)
5 1/4" disks: \$10.99 8" disks: \$12.99
- f) Hub-Reinforcer Rings: (50 rings ea. for hub-opening)
5 1/4" disks: \$5.85 8" disks: \$7.20
- g) Disk Sleeves: (Lint free, 10 ea.)
5 1/4" disks: \$2.55 8" disks: \$3.85

Add \$3 for ship & hdlg (AK, HI, PR, Canada add \$5.50, Foreign countries add USD 10.50) — Mass. Res. add 5% tax. Dealer inquiries invited. We acknowledge all trademarks

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Write No. 14 on Inquiry Card

58 JANUARY, 1984

Publications (continued)

social studies, foreign language, business education, SAT preparation, school business management, games, music, art, and more.

Programs are available for the Apple II, IBM PC, TRS-80, Commodore 64, Commodore Pet, and Atari microcomputers, and cover a range of grade and skill levels from primary through college. The catalog is available free upon request. *Opportunities for Learning, Chatsworth, CA.*

Write No. 510 on Inquiry Card

Brochure Features Telsol- Phone Robot

Telsol, an automatic phone robot, is featured in a brochure published by Digital Products Corp. Telsol uses recorded messages to communicate with parents, students, teachers, and school board members.

Telsol will provide a variety of telephone messages to do with such areas as: unexcused absence, tardiness, follow-up on inoculations, specified class cutting, advising parents report cards have been sent out, advising of special meetings, college financial aid programs, etc., multi-lingual messages, PTA/PTO meetings and messages, school closings, and congratulations to parents on achievements.

Up to 500 phone numbers can be entered into Telsol at one time. *Digital Products Corp., Ft. Lauderdale, FL.*

Write No. 515 on Inquiry Card

Catalog of Courseware

Aquarius, publishers of educational software, recently released its Fall 1983 catalog. The catalog lists a wide range of software products, including: Early Learning, Language Arts, Mathematics and Basic Skills.

Introduced in the catalog is "Early Childhood Readiness Skills Pro-

gram," Aquarius' newest software release. This series, designated for early learners and special education students, teaches skills in spatial relations, counting, classification and ordering and sequencing. The catalog is available free of charge. *Aquarius, Indian Rocks Beach, FL.* Write No. 536 on Inquiry Card

Handbook on Landing a Job

The Institute of Food Technologists (IFT) recently published a handbook titled, "How to Get Your First Job." Included are categories such as: writing resumes, networking, and 50 Questions Asked by Employers During an Interview.

Also discussed are the fears and traumas of new graduates as they embark upon their job search. The authors provide specific ways for the graduate to formulate his or her game plan. And they describe how to fully utilize the services available on college campuses.

The handbook also has a section devoted to the food science student which discusses the employment services available through the Institute of Food Technologists. *Institute of Food Technologists, Chicago, IL.* Write No. 537 on Inquiry Card

Catalog Features CAI for Music

Musictronic, Inc., has released its latest catalog, Computer Assisted Instruction for Music (CAIM). The new catalog offers a selection of computer software programs for music education.

The programs are compatible with several types of microcomputers. They are designed to assist students in learning basic, intermediate, and advanced music theory. A selection of advanced programs for music composition, arranging, and music synthesizers is included. Musictronic has also added new school music manager programs that assist in the inventory and distribution of uniforms and musical instruments.

Several computer/music hardware components and peripherals are featured, along with a section of computer support furniture. The furniture is offered in conjunction with information detailing the creation of a CAIM lab, a new concept introduced with the Musitronic catalog. The catalog is free. *Musitronic, Owatonna, MN.*

Write No. 507 on Inquiry Card
Rental Sales Equipment

An electronics rental sales catalog is available from the Electro Rent Corp. The 112-page catalog features closely calibrated rental and rental sales equipment for a variety of applications.

The catalog is updated often so sales and service people can draw correct information from it at all times. Included in the catalog are: amplifiers, analyzers, calculators, computers, counters, oscilloscopes,

meters, microprocessor development systems, power supplies, and more.

The catalog also covers telecommunications and input/output devices, such as CRT terminals and printers. *Electro Rent Corp., Elk Grove, IL.*

Write No. 538 on Inquiry Card

DECdirect Catalog For PC Accessories

Noise-reducing printer covers, printwheel cases and diskette binders and mailers are featured in a 32-page personal computer accessories catalog from Digital Equipment Corp.

The "DECdirect Catalog" also contains a 40-page pullout supplement of personal computer software. Each section includes "PCbasics," a few descriptive paragraphs that provide fundamental information about personal computers and

associated products. Another entry, "DEC-tion-ary," defines important computer terms such as "synchronous" and "high-energy transient."

Supplies such as diskettes and paper, peripherals such as printers, and accessories such as furniture and electrical line filters are covered. Equipment can be ordered from the catalog by mail or through a toll-free number. *Digital Equipment Corp., Merrimack, NH.*

Write No. 531 on Inquiry Card

Computer Literacy Newsletter

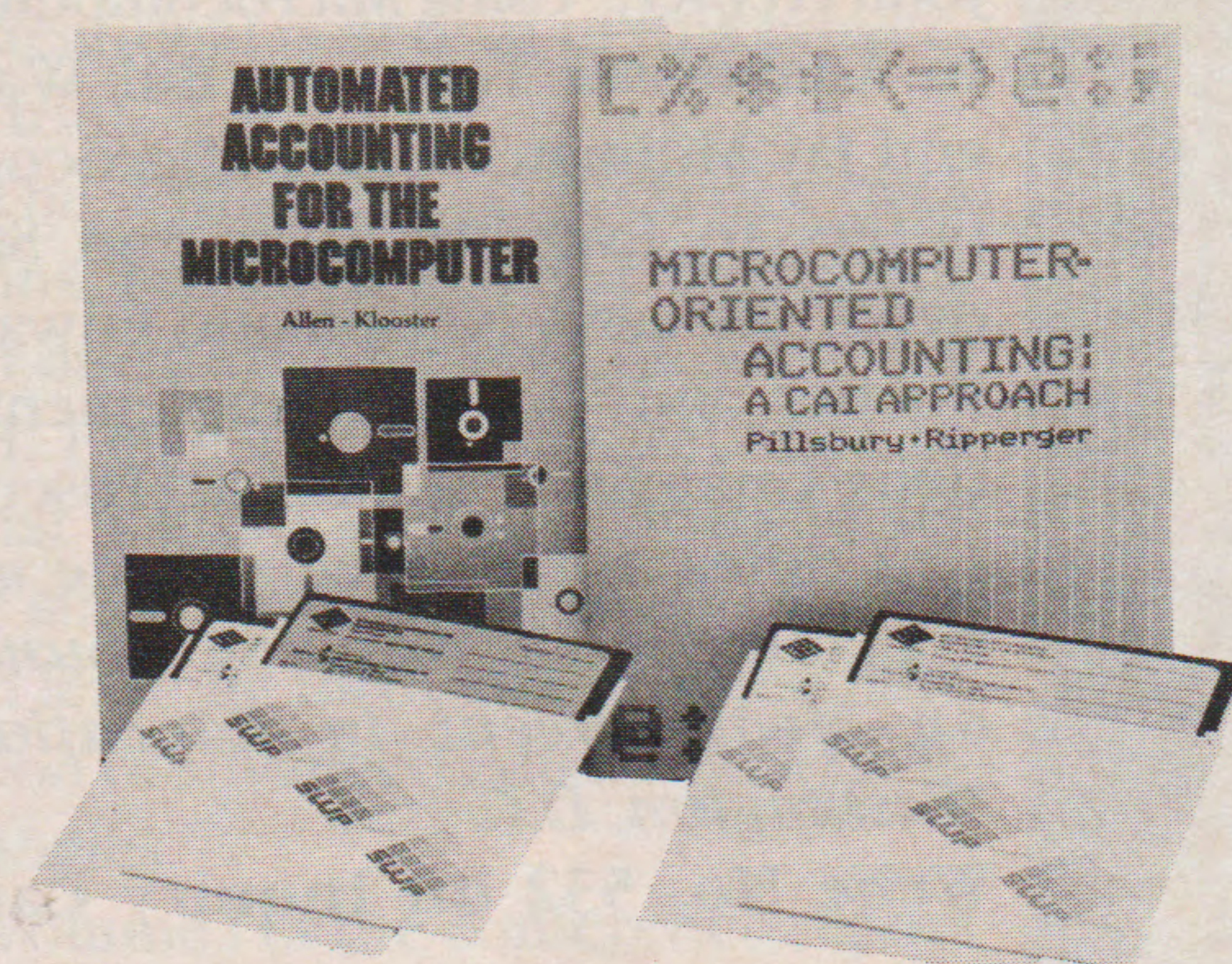
A computer literacy newsletter is being published by the Educom Computer Literacy Project. The newsletter addresses topics of interest to the higher education community.

Included in the publication are:

(continued on page 60)

Team Up These Accounting Materials With Your School's Microcomputer

You'll See Great Results



MICROCOMPUTER-ORIENTED ACCOUNTING: A CAI APPROACH

introduces students to accounting via the microcomputer. Students will use the microcomputer to journalize, post, and prepare trial balances, as well as to computerize worksheets, bank reconciliations, payrolls, and depreciation schedules for plant assets.

AUTOMATED ACCOUNTING FOR THE MICROCOMPUTER is for students with some background in manual accounting procedures. Students will key-enter accounting data, instruct the microcomputer to perform operations in the correct sequence of steps, and print and review financial forms and statements produced by the computer.

Coming Soon! VIDEO GALLERY SALES & SERVICE: An Automated Accounting Simulation revolves around a wholesale video supply company specializing in the sales and service of video equipment. Students will "work for" VIDEO GALLERY for one business month, processing accounting transactions on the microcomputer that involve: purchases and sales on accounts, correcting and adjusting entries, sales discounts, credit terms, purchase discounts, and more.

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GET IT ALL TOGETHER

MICROCOMPUTERS: HARDWARE, SOFTWARE, & PROGRAMMING

by Edward J. Coburn

At last a comprehensive introduction to microcomputers that combines the study of hardware and software with BASIC programming to give students an in-depth knowledge of machine functions not available in any other text. The BASIC sections are interspersed throughout the text keeping motivation high and giving students early hands-on experience.

Coverage features most available types of hardware including specialized devices, software and some information on advanced languages. The carefully paced, enjoyable writing style is complemented by many diagrams, flowcharts and photographs while math is kept to a minimum.


Every chapter is complete with behavioral objectives, highlighted terminology included in a glossary with definitions, summary, questions to aid understanding and a quick quiz. A Study Guide accompanies the text as well as an Instructor's Guide which has transparency masters, a test bank and much more. (0-672-98445-8)

MICROCOMPUTER SOFTWARE TESTBANK SYSTEM

by Edward J. Coburn

This generic software testbank system can be used with any textbook and gives instructors the freedom to create their own testing methodology without giving up the convenience of computer assistance. Questions can take 7 formats from true/false to essay, be selected by any of 30 criteria and printed in several ways. A Tutorial User Manual is provided. Available 1984

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Also ask about the complete line of popular Howard W. Sams computer science, data processing and software titles. A catalog detailing the entire list is available.

Write No. 56 on Inquiry Card

Publications (continued)

articles about computer literacy programs for faculty; progress notes on the four categories of project volunteers; survey results from a preliminary questionnaire sent out in the spring of 1983, and a calendar of conferences and events.

The newsletter is aimed at faculty, staff and administrators interested in information on computer literacy programs.

Educom, a non-profit consortium of more than 475 colleges, universities and research organizations, provides direct services that support the introduction, use and management of computer-related technology for teaching, research and administration in higher education. *EDUCOM Computer Literacy Project, Princeton, NJ.*

Write No. 520 on Inquiry Card

New MECC Catalog for 1983-84

The Minnesota Educational Computing Consortium (MECC) lists 190 educational computing programs and training materials in its most recent catalog.

Available free, the catalog provides information on software and courseware for the Apple II, IBM, Atari 400/800, Commodore 64 and Radio Shack computers. *MECC, St. Paul, MN.*

Write No. 528 on Inquiry Card

Data Processing Course Catalog

A 56-page catalog of information processing courses for employed persons, being given at seven locations around the country, is available from QED Information Sciences, Inc.

Courses are scheduled for Boston, Mass.; New York/New Jersey in New York City; Philadelphia, Pa.; Richmond, Va.; St. Louis, Mo.; Dallas-Fort Worth, Texas; and Seattle, Wash. Where appropriate, classes

can be scheduled to take place at company or public facilities.

Ranging in duration from three to five days, training is grouped into a systems development series, a systems management series, a data base series, and data communications and software series, as well as others on operating systems, management and interpersonal skills, and personal business computing.

Also included in the catalog is a section devoted to a group of QED books which can be used as reference texts by students. *QED Information Sciences, Inc., Wellesley, MA.*

Write No. 539 on Inquiry Card

Microcomputer Use in Testing

The second issue of "Educational Measurement: Issues and Practice in 1984" will be a thematic issue on microcomputers in testing. The following articles will be included: "History, Applications and Future Trends in Using Small Computers for Testing" by Evelyn Brzezinski; "Using Microcomputers to Develop Tests" by Ronald Hambleton and John Fremer; "Using Microcomputers to Administer Tests" by Bill Ward and Jay Millman; "Using Microcomputers to Evaluate Tests and Students" by Larry Nelson and Edward Roeber; and "Potential Implementations/Guidelines" by Michael Hiscott.

Copies of this special issue are available for \$5. *National Council on Measurement in Education, Washington, D.C.*

Write No. 532 on Inquiry Card

Software Catalog for Apple Computers

A catalog of Cross Educational Software lists programs for Apple computers.

Main subject areas of the software listed are: physics, teacher education, Christian education, and elementary games.

A general physics series is designed to accompany introductory

physics courses. The average level of the programs is for college freshmen. Some of the titles of the series are: Vectors & Graphing, Statics, Motion, Conservation Law, Circular Motion, Thermodynamics, Optics, and Solar System Astronomy.

Also listed are lab interfaces that plug into the Apple game connector. Labs are available for light, heat and sound.

Other software programs listed include: Create-A-Test, Grade Reporter, Peachy Writer and Aquarium. *Cross Educational Software, Ruston, LA.*

Write No. 519 on Inquiry Card

Report Summarizes Computer Conference

The Office of Educational Research and Improvement has released a special report, "Computers in Education: Realizing the Potential." The report is the result of a conference held in Pittsburgh, Pa., November, 1982 at which 40 teachers, educational researchers, and scientists from the public and private sector gathered to discuss the future of computers in education, and the research required to realize the educational potential of this powerful tool.

The Pittsburgh conference was sponsored by the U.S. Department of Education as a part of Secretary T.H. Bell's Technology Initiative to assist schools in their efforts to set the stage for excellence in teaching and learning through the implementation of advanced educational technologies.

Volume I of the conference report contains an introduction followed by the summary and conclusions of the conference reported by the chairmen. Volume II includes the full proceedings of the conference, including 13 invited papers and the reports of the two conference committees, one dealing with considerations for mathematics and science, and the other with reading and writing.

The report, which refers to the

computer as a "one-in-several centuries innovation," addresses new educational needs resulting from society's increasing dependence on computer power and information technologies. It explores the opportunity for educational improvement offered by recent developments in cognitive science and advanced computer capabilities in such applications as tutoring, creating exploratory learning environments, diagnosis, networking, and game technologies; and in the computer's capacity as a tool for students and teachers, as well as an administrative aid to increase teacher productivity.

Recommendations for actions required to realize this opportunity include: a call for a sustained national investment in basic research on cognitive issues and artificial intelligence; associated applied research on enhanced design principles for human-computer systems

for education; and support for prototype research in which these basic principles are refined by trial and pilot applications in the classroom. *U.S. Government Printing Office, Washington, D.C.*

Write No. 529 on Inquiry Card

Psychological Testing System

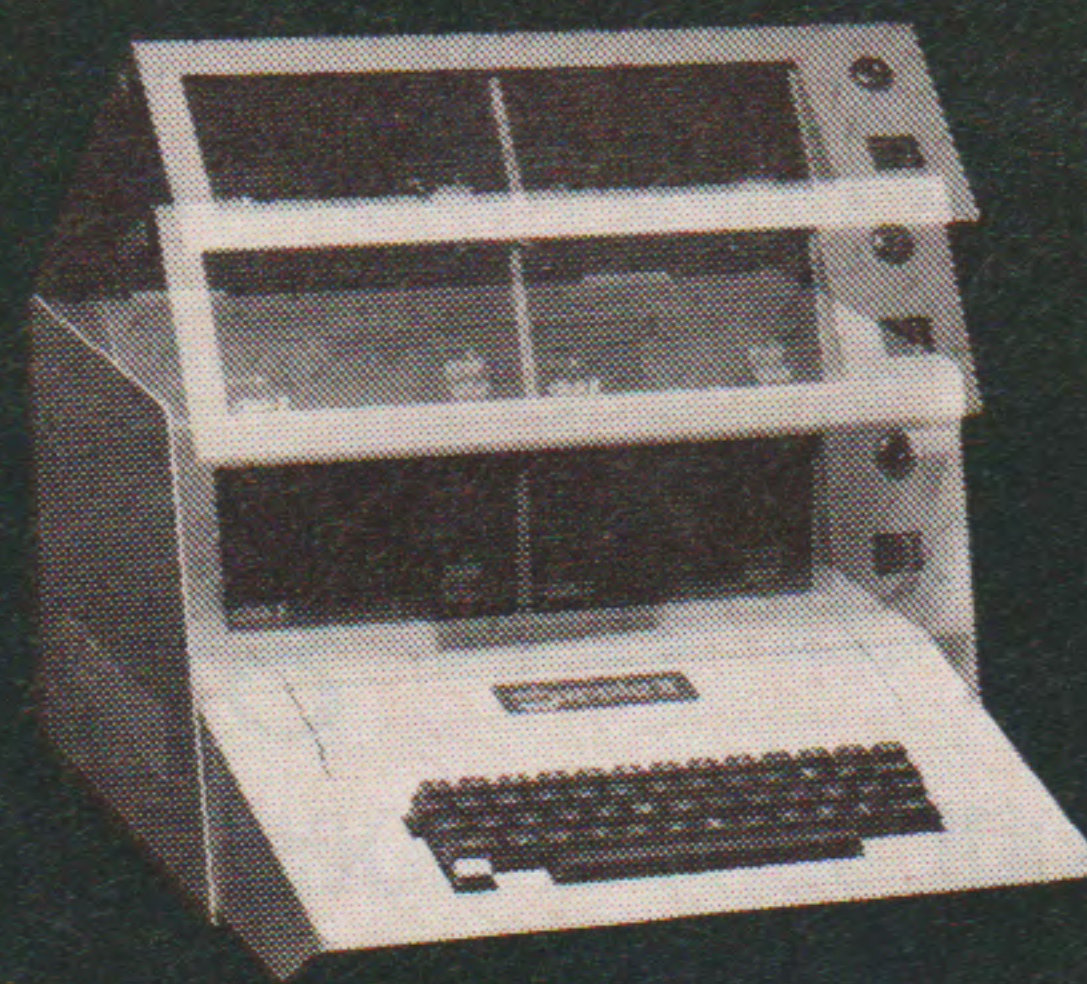
The Psychometer 3000, a computerized psychological testing system, is described in a four-page four-color brochure.

The Psychometer 3000 was designed to eliminate the burden of administering tests, thus freeing the counselor to spend more time with patients. It administers tests, scores them, and provides completed printed evaluations.

A high-resolution color CRT offers a wide range of test stimuli designed to enhance patient motiva-

(continued on page 64)

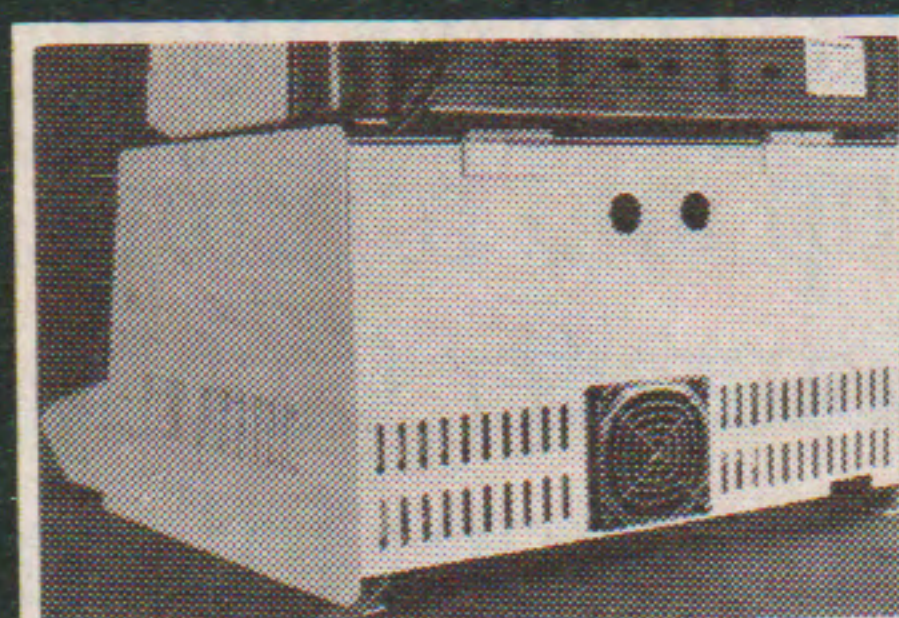
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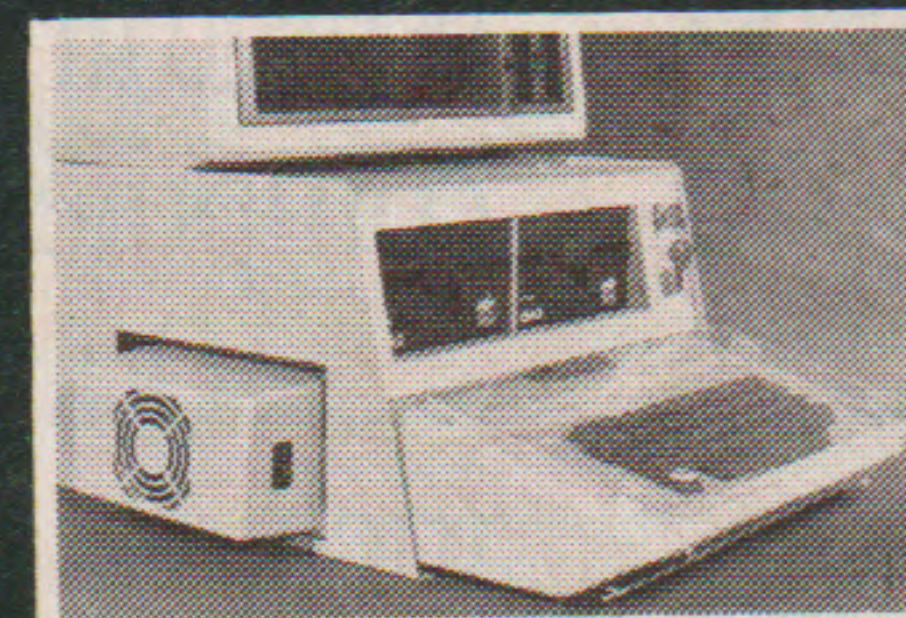
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opens up to allow you quick and easy access inside your Apple. The key switches power to your Apple system and the filtered cooling fan. The SURGE SENTRY, by RKS Industries, protects your Apple from harmful voltage spikes.



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Write No. 38 on Inquiry Card

Announcing the Apple Computer Club Merit Awards.

Thousands of schools don't yet have formal computer classes but are helping students, teachers and parents gain computer literacy by sponsoring student computer clubs.

Computer clubs stretch limited school resources and often provide some valuable community services.

In recognition of these club achievements, and to encourage the formation of new student computer clubs, Apple Computer is proud to announce the first Apple Computer Club Merit Awards.

The golden apple.

A panel of five independent judges will choose 50 semifinalists in the following two categories:

- Individual student entries.

- And student club entries.

The finalists picked from this group will be flown to Washington, D.C. along with a parent or teacher advisor for an all-expense-paid five day trip to showcase their submissions and tour the Capitol.

The winning school club will be awarded ten complete Apple IIe computer systems with a retail value of approximately \$20,000.

In the individual competition, the winner will be awarded \$1000, runners-up will each receive \$500, and semifinalists will each receive \$100 for their efforts.

In addition to a free trip to Washington, D.C., Apple computer systems and cash prizes, winning

clubs or individuals will receive a Golden Apple, Silver Apple or Bronze Apple award or a merit certificate.

Winning ideas.

Since the primary objective of most computer clubs is educational, it is not necessary to be a computer whiz kid or programming genius to win.

Originality, social and educational value, and community service count for as much, if not for more, than sheer programming skill.

It might be a club project that applies computers to help school athletics programs...or helps the Red Cross with disaster relief...or helps boost SAT scores...or simply helps others learn about computers.

Judging will also be weighted by the age of the entrants, so sixth graders will have the same opportunity to win as high school seniors.

Go for the gold.

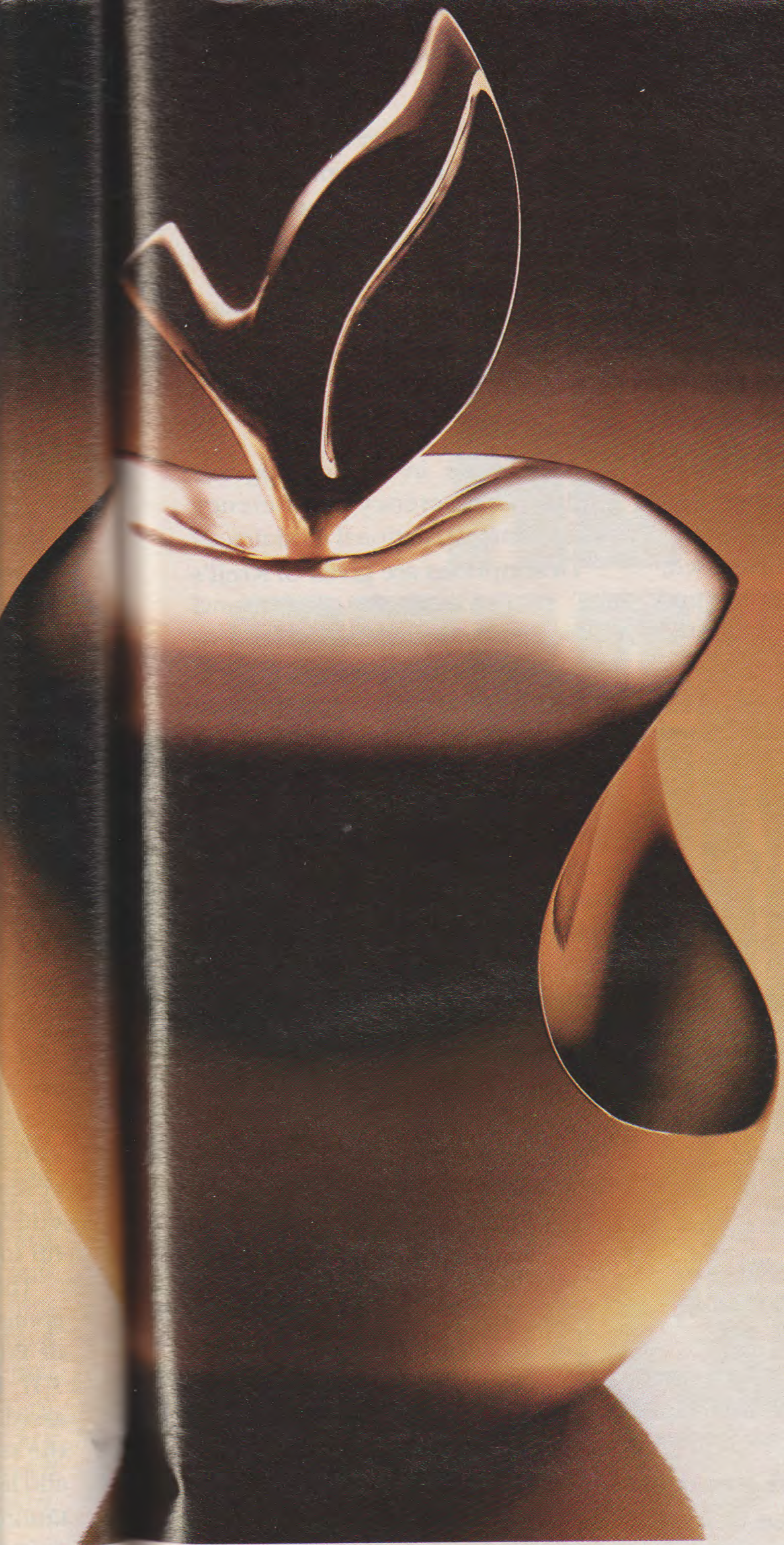
Even if your school doesn't have a computer club at the moment, there is still time to enter the Apple Computer Club Merit Awards.

Simply fill out the coupon and we'll not only send you all the competition details, the rules and entry forms...we'll also send you everything you need to get your own computer club up and running.

Our free Computer Club Kit includes everything from informational posters to club membership forms to a comprehensive Computer

Club Advisor's Manual with information on everything from fund raising to winning computer competitions. But hurry—supplies are limited.

So mail in the coupon now. And come March, 1983, and your students could find themselves on your way home from Washington, D.C....with \$20,000 worth of Apple souvenirs.



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Publications (continued)

tion. Graphics capability allows the presentation of mazes, graphs and spatial relations tests.

The test comes complete on computer diskettes. *National Computer Systems, Minneapolis, MN.*
Write No. 526 on Inquiry Card

Brochure Describes Olympia's 'People'

"People," Olympia's name for its new microcomputer, is described in a four-color fold-out brochure

People's main unit operates on the Intel 8086 16-bit microprocessor. The system comes with two 5-1/4" floppy disk drives, each with a 655 Kb capacity. Both the 91-key, typewriter-like keyboard and the ergonomically designed monitor are free standing, allowing them to be placed in any location for maximum

comfort and convenience, according to the manufacturer.

The brochure describes available software packages, including financial spreadsheet, data base management, graphics and word processing. Applications in areas such as law, medicine, and accounting are described along with expansion capabilities.

A color monitor that can display a range of eight foreground and eight background colors, and the system's graphics application, are discussed.

Full display, storage, interface and memory capabilities are presented in a People Characteristics Summary. *Olympia USA, Inc., Somerville, NJ.*
Write No. 533 on Inquiry Card

Courseware for Several Computers

Educational and recreational software are featured in the Krell

Software Corp. Winter 1984 Catalog.

The software is compatible with Acorn, Apple, Atari, and Commodore computers, and the TRS-80 and IBM PC.

Programs featured in the 15-page catalog include: Sprite Graphics; The Best LOGO for Apple II; Adventures in Flesh; Descates' Delight, and Connections.

Also listed in the catalog are Krell's competency proficiency assessment instructional modules.

Descriptions are given of Krell's SAT contest and the Educational Software Contest. Krell will give prizes for the best original educational software in each of the following categories: arts, humanities & philosophy; LOGO & other topics; social studies; business math/natural sciences, and special subjects. *Krell Software Corp., Stony Brook, NY.*

Write No. 527 on Inquiry Card
(continued on page 6)

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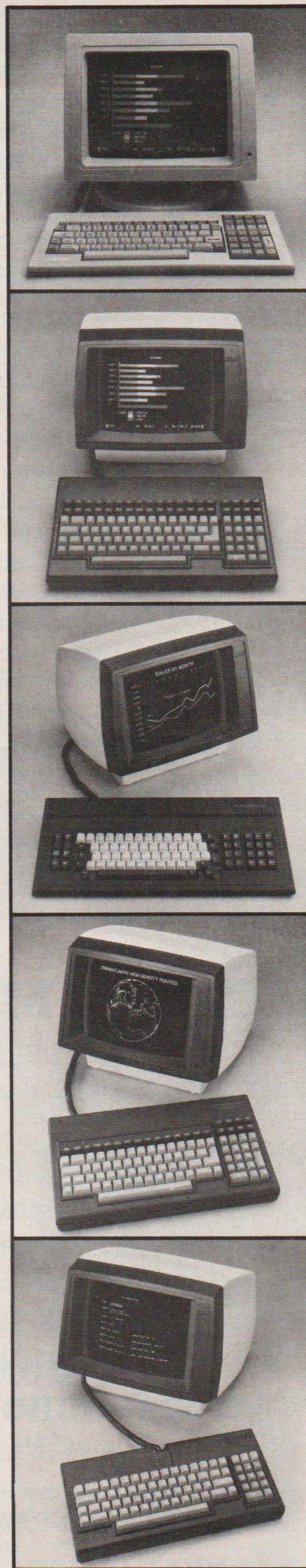
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Publications (continued)

Science Filmstrips, Videocassettes

A science sound-filmstrip and videocassette catalog features 14 new programs. The programs listed in the catalog are aimed at upper elementary, secondary, and college students, as well as adults and gifted children.

Time, Space, and Spirit: 12 Keys to Scientific Literacy is featured in the 14-page 1983-84 catalog. Programs focus on: the atom; the gene; natural resources; scientific methods and values; the expanding universe; evolution; the changing earth; climate, weather and people; disease and health; toxic wastes; nuclear power, and the computer.

Other programs listed include: Spaceship Earth; The Soul of Science;

The Human Mind; the Great Lakes, and the Rocky Mountains. *Hawkhill Associates, Inc., Madison, WI.*

Write No. 530 on Inquiry Card

Catalog Features Business Software

Career Aids Inc. recently published its 1983-84 Microsoftware Solutions catalog of software, books, games and accessories specially selected for business-people and professionals.

Descriptions include information on memory requirements, printer needs and format. A Software Help-line, staffed by technical support personnel, is available for telephone assistance in selecting software as well as after-purchase information, advice and suggestions. *Career Aids/Microsoftware Solutions, Chatsworth, CA.*

Write No. 535 on Inquiry Card

Brochure Outlines Uses for UPS's

Power irregularities that disrupt computer performance are examined in a brochure recently released by Clary Corp.

The four-color, eight-page brochure outlines solutions to problems, such as the weather, and local electrical and on-site conditions that lead to brownouts, voltage sags and surges, momentary outages and high intensity transients.

UPS's supply AC and backup power to sensitive computer-based equipment. A UPS draws current from on-line batteries without interruption or time lag switching. *Clary Corp., San Gabriel, CA.*

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Books

Disks, Files, and Printers for the Apple II

B. Blackwood & G. Blackwood
Bobbs-Merrill Educational Pub.
Indianapolis, IN
262 pp., \$15.95

This book is intended for students interested in studying the first level of list processing. It provides basic to advanced details in using disks,



BASIC TO ADVANCED DETAILS

files and printers, including explanations of sequential access, random access and executive files.

File structure is emphasized by programs written in sections, explained and then put together as a functional unit. Advanced programming techniques are presented on a simplified level.

The fourth in a series written for the beginning programmer using the Apple II computer, this book augments the information presented in "Intimate Instructions in Integer BASIC," "APPLESOFT Language," and "Apple FORTRAN."

Write No. 704 on Inquiry Card

The TI 99/4A User's Guide

C. Casciato & D. Horsfall
Bobbs-Merrill Educational Pub.
Indianapolis, IN
190 pp.
\$11.95

Publishers bill this as an easy-to-use guide, containing complete information on all aspects of the TI 99/4A. It ranges from how to set up and operate the starter system to options for expansion.

Peripherals available for the TI 99/4A and explanations of what they do are provided, as well as suggestions on how to expand the system.

The text contains a chapter on languages available for the TI 99/4A, including TI BASIC, Extended BASIC, LOGO II, 9900 Assembly Language, UCSD PASCAL, PILOT, and FORTH, and shows situations where these languages are more appropriate than BASIC.

Appendices include several BASIC programs and a glossary of computer terms.

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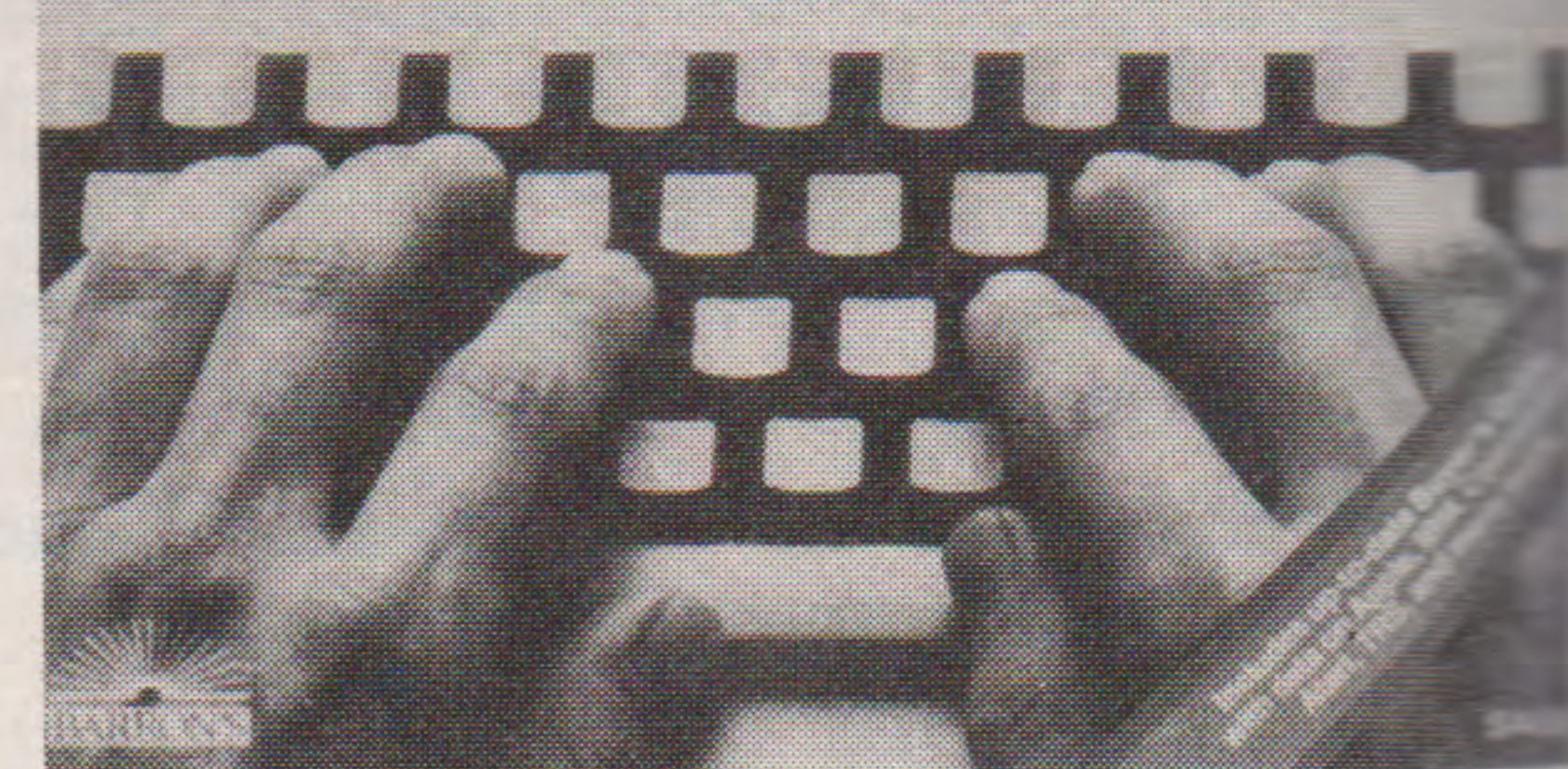
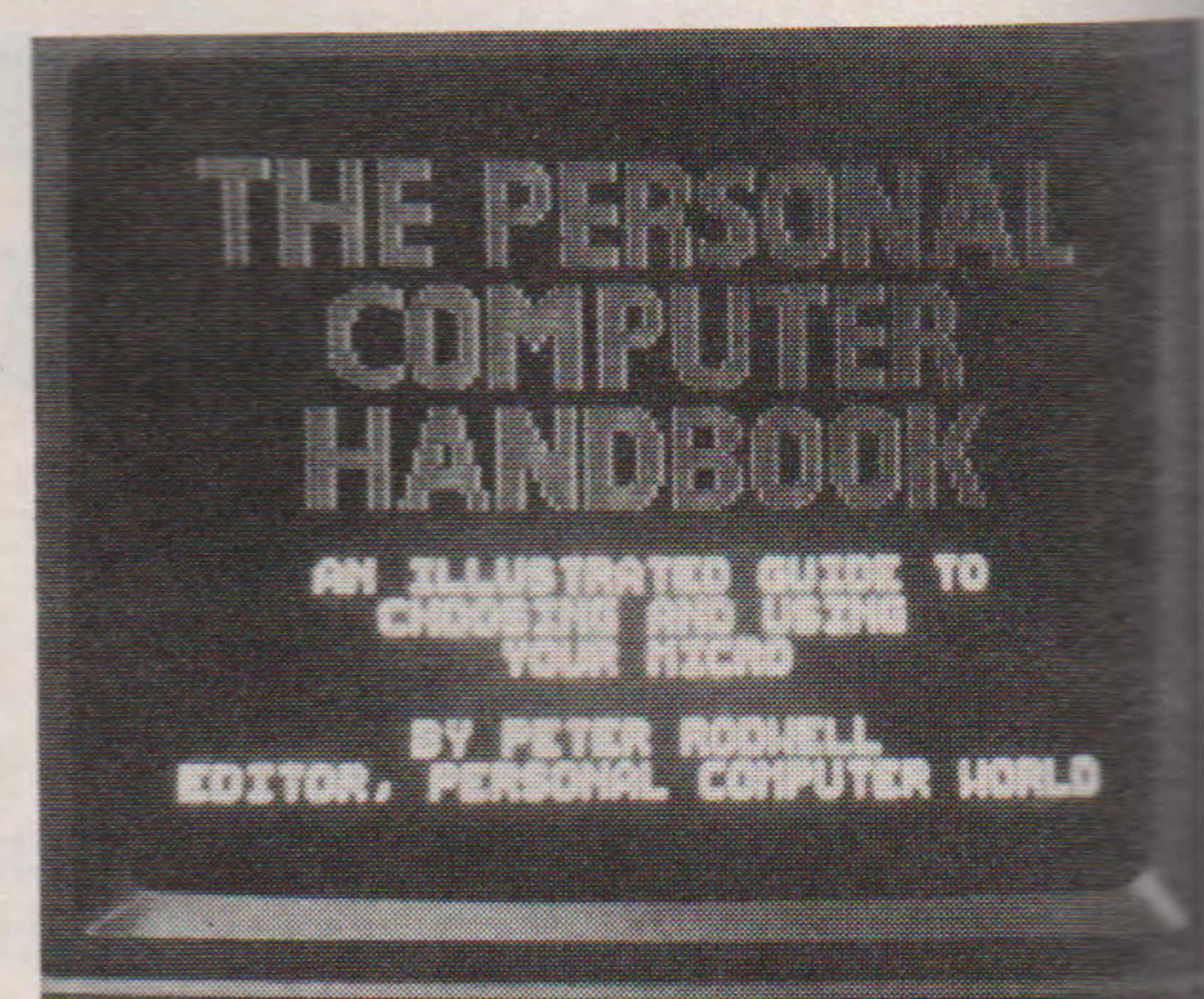
The Personal Computer Handbook

Peter Rodwell
Barron's Educational Series, Inc.
Woodbury, NY
208 pp., \$14.95

More than 450 photographs and diagrams are used in this book to provide a comprehensive source of visual information about computers. The graphics are full-color and often displayed in a large format.

The book is organized into color-coded modules that take the reader inside a computer and explain how it works. A glossary and buyer's guide are included. In the buyer's guide Rodwell describes the advantages and disadvantages of the more popular computers — Apple, IBM, Sinclair, Commodore, Radio Shack and Atari — as well as 26 other computers.

Rodwell takes a basic approach describing the mechanisms that compose a computer — both hardware



450 PHOTOS & DIAGRAMS

and software — and covering everything from chips, memory and disks to computer games, graphics and word processing. Computer languages are explained, as well as how to create and debug a software program.

The final module of the book features brand name descriptions with photographs of the various personal computers now available and specifics on how to choose one.

Write No. 718 on Inquiry Card

How to Use Scripsit

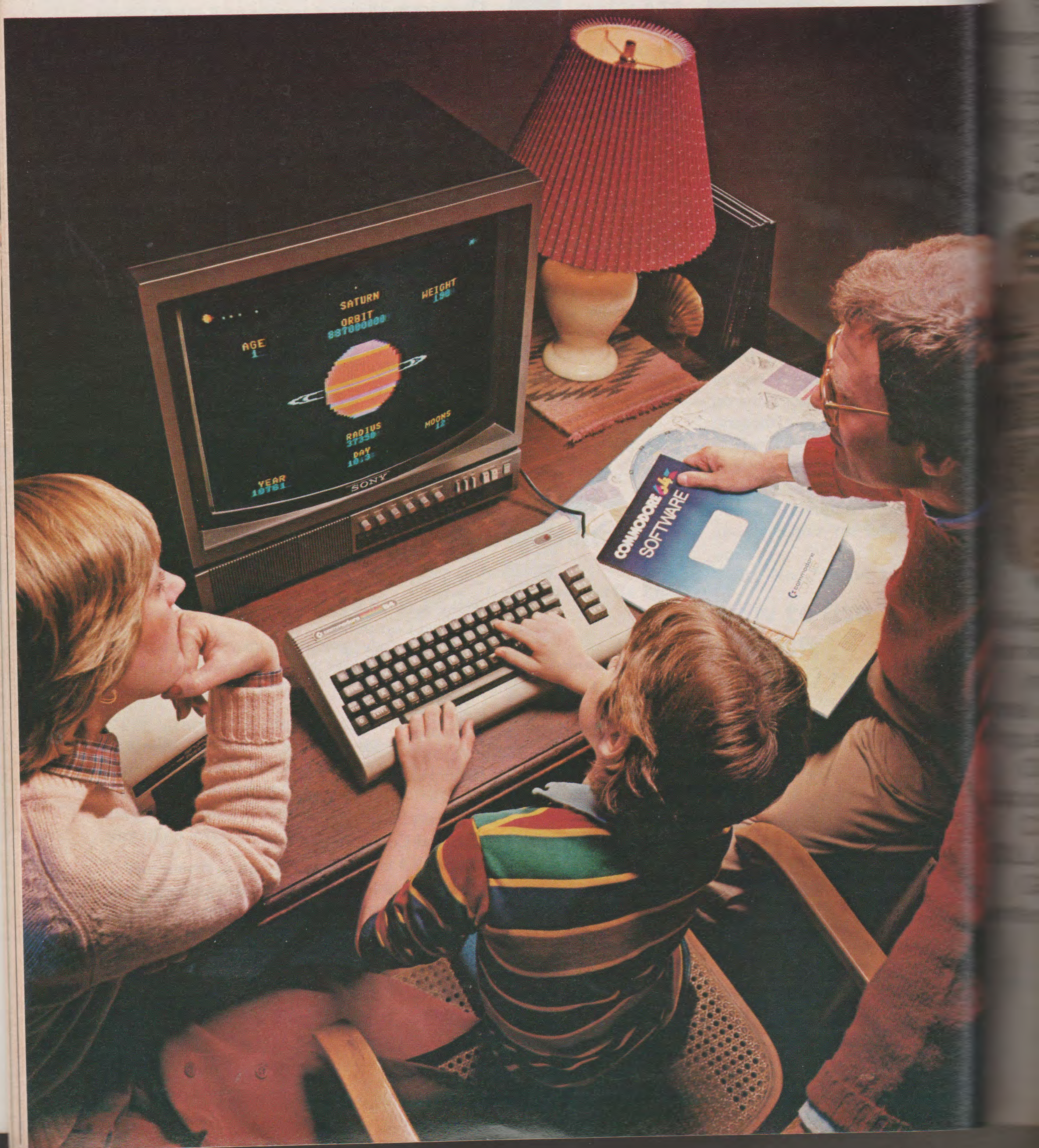
C. Maddux, J. Pederson & J. Willis
Dilithium Press
Beaverton, OR
150 pp., \$9.95

This book is aimed at helping the reader master Scripsit. The first part of the book is a Scripsit tutor. It assumes the reader has no knowledge of microcomputers or of the Scripsit programs. A step-by-step handbook, it contains many examples, photos and illustrations.

Chapters include: Screen Parameters; Printout Parameters; Page Numbering and Other Messages

(continued on page 7)

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Apple® IIe or the IBM® Personal Computer. **But at far less than half the cost.** You also get a 9 scale music synthesizer, high resolution color graphics, and a wide variety of educational software. Now teachers and parents can work together to provide quality education for students.

For Home and School—We've just released numerous educational software programs into the public domain. These programs, written by educators, include courses in Business, Computer Science, English, French, Geography, History, Mathematics. The list goes on and on.

We're also working with major educational publishers to develop new software. For example, a significant portion of the well-regarded MECC courseware has been completely adapted for the Commodore 64. The Edufun™ series from

Milliken will be available for home and school use in the near future, and over thirty early learning programs from Midwest Software will help children master the basics.

In addition, we've developed a complete set of software tools to make our educational computers even more useful. Take Logo and PILOT, for example. These popular languages have been completely adapted for the Commodore 64.

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Books *(continued)*

Other Advanced Functions; Problems and Cautions, and Error Messages.

Part Two of the book is a reference — an index to topics and commands that includes a brief discussion of each. Each entry is cross-referenced to the page in the tutorial section dealing with that topic or command.

Write No. 713 on Inquiry Card **Video Basics**

Welby A. Smith, Jr.

Development Communications Assoc.
Alexandria, VA

\$15.95

Publishers bill this book as a practical, common-sense approach to video for both the consumer and professional user.

The book includes: time- and money-saving tips on choosing video equipment; step-by-step instructions with diagrams for playing back videocassettes, making audio dubs

and duplicating tapes; tested strategies for planning video programs, and commentaries on current and future trends in video communication.

Write No. 717 on Inquiry Card **How to Do It** **on the TRS-80**

William Barden, Jr.

I.J.G., Inc.

Upland, CA

\$29.95, plus \$4 shipping

This book is directed at helping the users of TRS-80 Models I, II, III, 4, the Color Computer, or Model 100 understand their computers.

Publishers bill it as a book loaded with easy-to-understand answers to hundreds of problems that the computer user is confronted with.

Answers are cross-referenced. Also listed is hard-to-find software and technical information not covered in a user's manual.

Write No. 706 on Inquiry Card

Timex/Sinclair **Interfacing**

J. Downey & D. Rindsberg

Prentice-Hall

Englewood Cliffs, NJ

146 pp., \$10.95

This book is a compilation of the basics of microprocessor interfacing, written for beginners. It was written to teach the user how to build and then design useful peripherals for Sinclair computers.

Included in the book is chip data for all the integrated circuits that are mentioned, construction techniques for digital circuits and plans for a logic probe to troubleshoot projects.

Principles of interfacing described in the book also apply to other microprocessors so that design skills learned in the environment of the Sinclair computer can be applied.

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NASHUA (single density)	\$140 per 100
VERBATIM	\$190 per 100

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plied with minor modifications to more complex microcomputers or minicomputers.

All projects described in the book have been tested by the authors. A few of the projects involve 110 VAC house current for operation. **Write No. 726 on Inquiry Card**

More than 32 BASIC Programs for the Commodore 64 Computer

T. Rugg & P. Feldman
Dilithium Press
Beaverton, OR
328 pp., \$19.95
\$34.95 with software

This book comes with software ready to run on a Commodore 64, or the user may buy the book and type the programs in. The book is directed at beginners in the field who have learned the basics of communicating with the computer.

The contents include: applications programs (practical uses for home or work); education programs; game programs; graphics display programs, and math programs (math, engineering and statistical uses).

Write No. 702 on Inquiry Card

100 Ready-To-Run Programs and Subroutines for the IBM PC

J. Bretz & J.C. Craig
Tab Books, Inc.
Blue Ridge Summit, PA
320 pp., \$15.95 paperback
\$22.95 hardbound

A collection of ready-to-run programs, this book provides a range of software applications that take advantage of the advanced features and capabilities of the IBM PC.

Programs address such subject areas as: business, calculus functions, complex number math, educational games, electronics, personal

finance, graphics demonstrations, calendar computations, matrix math, modem routines, statistics, vector analysis and programming utilities.

Each program featured has been designed and written with the IBM PC's characteristics and abilities in mind, according to the publishers. The book also contains many subroutines, each of which is explained and demonstrated by use in the book's main programs.

Write No. 708 on Inquiry Card

Apple II Applications

Marvin L. De Jong
Group Technology, Ltd.
Check, VA
236 pp., \$14.95

This book demonstrates how to use the Apple II to make measurements of physical quantities, to control other devices and to communicate with other computers.

Each topic is covered in sufficient depth to enable the user to go beyond mere duplication, toward developing the necessary skills to create and solve individualized applications, according to the publishers.

In most cases, commercially available boards have been used to illustrate such circuits as analog-to-digital converters, digital-to-analog converters, modems, frequency counters, stepper motors, thermistors, solid-state switches, and more.

Each application begins with simple examples and programs, usually written in BASIC. More challenging applications follow. Machine language programs are used where speed advantages are required.

Among the examples of applications given are: measuring shutter speed of a camera, reaction time, resistance, light intensity, and temperature; controlling relays; a constant temperature bath; proportional control of an AC load, and controlling a solid state switch.

Write No. 715 on Inquiry Card

Electronic Life: How to Think About Computers

Michael Crichton
Alfred A. Knopf
New York, NY
209 pp., \$12.95

A conversational look at computers and their use, this book provides a comfortable "in" to the computer world.

Written by Michael Crichton, author of "The Andromeda Strain" and "The Terminal Man," "Electronic Life" is an armchair guide to approaching computers and putting them in the proper place in one's life and work.

The book ranges from step-by-step instructions on what to do when you first approach a computer to advice on how to avoid computers causing family trouble.

Crichton also provides specifics, such as discussion of computer anatomy, what to think about when buying a computer, and basic definitions of computer terms, such as bytes, compatible, courseware, down, error messages, and microchip. Appendices of computer programs are contained in the back of the book, designed to help the reader feel comfortable and in control of his/her computer.

Write No. 723 on Inquiry Card

CP/M and the Personal Computer

T. A. Dwyer & M. Critchfield
Addison-Wesley
Reading, MA
492 pp., \$19.95

The authors break CP/M into its components and compare it to a collection of building blocks.

The idea is to help readers master the disk operating system by describing what tools CP/M includes, how they work, and how to apply them to business, professional or personal computing.

(continued on page 74)

Books (continued)

The authors combine their explanations with self-study techniques and a four-color photographic insert that illustrates screen output from a variety of programs. Included are examples of computer systems that run CP/M.

Write No. 714 on Inquiry Card

Beginning FORTH

Paul Chirlian

Matrix Publishers, Inc.

Beaverton, OR

220 pp., \$16.95

A self-teaching guide on how to program in FORTH, this book assumes the reader has little programming experience.

The author compares FORTH to other popular programming languages, explains editing procedures,

covers debugging, and includes a glossary.

Chirlian starts with very basic ideas the reader should know to begin programming and builds up to the more complex procedures. A variety of exercises concludes each chapter.

Chapter topics include: Introduction to FORTH Programming; Basic FORTH Operations; Basic Input and Output; Control Statements — Basic Ideas of Structured Programming; A General Discussion of Numbers; Constants, Variables and Arrays; Characters and Strings; Disk Operations, and Some Additional FORTH Operations.

The book also examines the proposed "standard" version of FORTH, FORTH-79, and gives information on its arithmetic operation, stack manipulation and the writing of its words.

Write No. 712 on Inquiry Card

Affordable Word Processing

Richard A. McGrath

Prentice-Hall

Englewood Cliffs, NJ

The subhead of this book is: "How to Find a Low-Cost System that Fits Your Needs and Your Budget." The author notes the book is directed at those people with paperwork needs — authors, students, doctors, lawyers, entrepreneurs, realtors and business people.

He describes it as a "crash course" designed to transport the reader from the world of typewriters into the realm of word processing.

Chapter headings include: Is Word Processing for Me?; Background and Basic Concepts; System Input and Display; System Output; Memory and the Processor; Systems and Expansion; and Money, Dealers, and a Cost-Effective System.

(continued on page 75)

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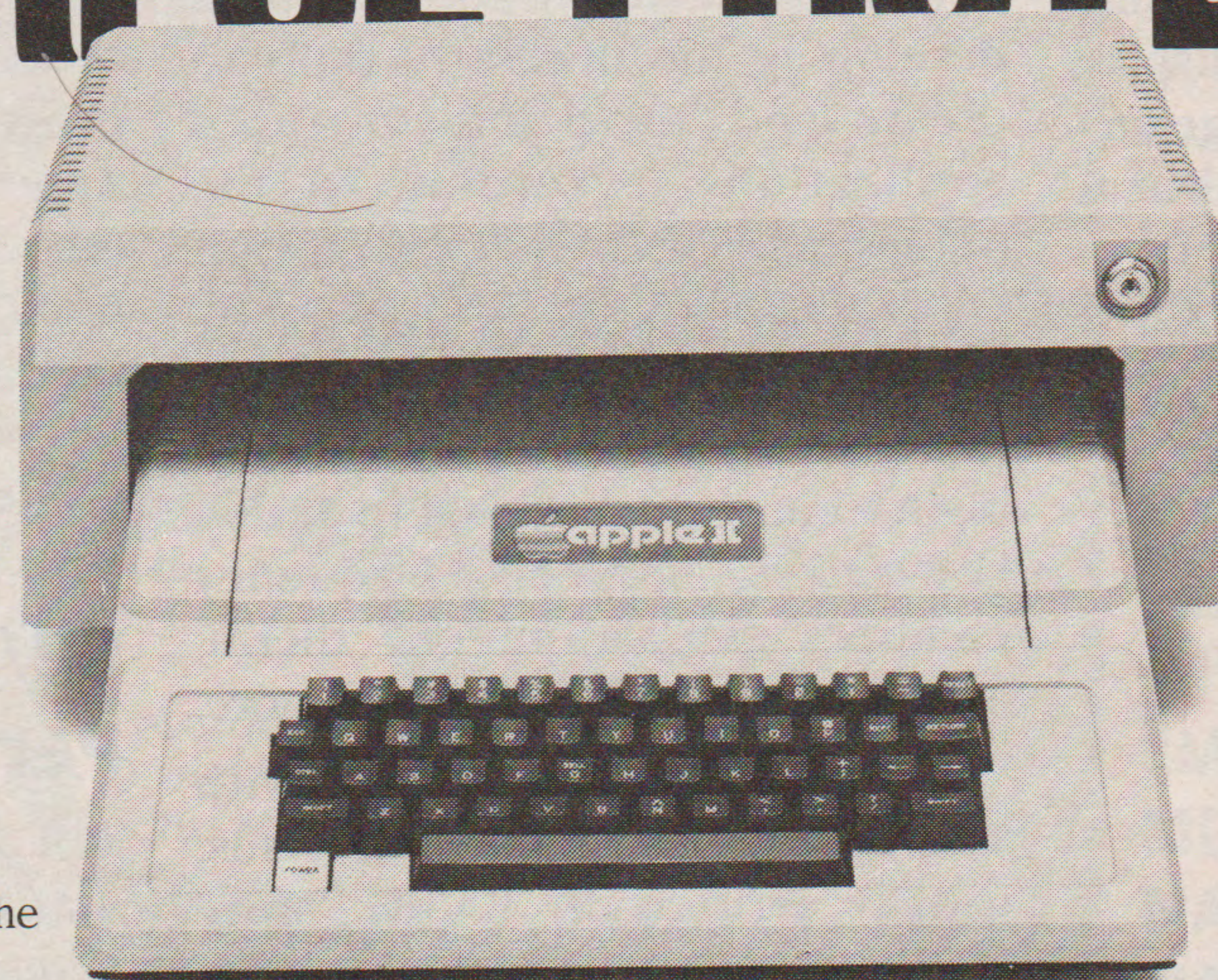
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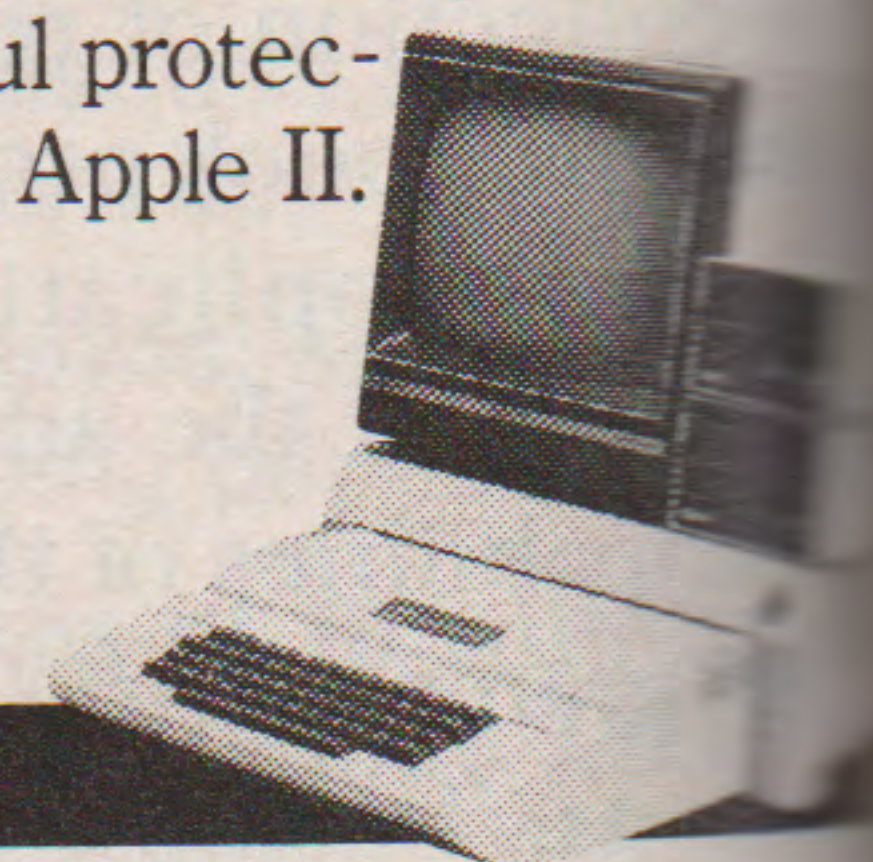
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Write No. 2 on Inquiry Card

Books *(continued)*

Written in clear, conversational style, the book provides a comprehensive, problem-solving approach to mastering the world of word processing. A listing of companies that make word processors and their addresses is found in the back of the book, along with the bibliography and an in-depth glossary.

Write No. 721 on Inquiry Card

What Do You Do After You Plug It In?

*William Barden, Jr.
Howard W. Sams & Co.
Indianapolis, IN
198 pp., \$10.95*

The first part of this book covers use of microcomputer hardware, software, languages, operating systems and data communications. That is followed by a second tutorial on

workable solutions to the practical problems that can occur during the use of the equipment.

The author discusses hardware and peripherals — plotters, monitors, disk drives — as well as advanced technology in such devices



HANDBOOK ON PRACTICAL PROBLEMS

as print heads, bubble memory and high-resolution graphics.

Barden also covers packaged applications software, operating systems, programming languages and other software topics, and includes a checklist for the software buyer.

Write No. 719 on Inquiry Card

TRS-80/Z80 Assembly Language Library

*Craig A. Lindley
Wayne Green, Inc.
Peterborough, NH
355 pp., \$34.97*

Designed to be read and used at the computer, this book is published in an 8-1/2" by 11" easel-backed binder. Two TRS DOS-compatible disks are bound in with the text.

Lindley explains the Z80 assembly language, using some 45 figures and 75 program listings. Included are more than 15 utility programs.

The two Model I TRS DOS-compatible disks contain 33 source and object files. Many of the programs also run on the Model III (those that do not require minor modification). Many of the routines in the programs are usable on any Z80-based microcomputer.

Write No. 710 on Inquiry Card

WordStar in Everyday English

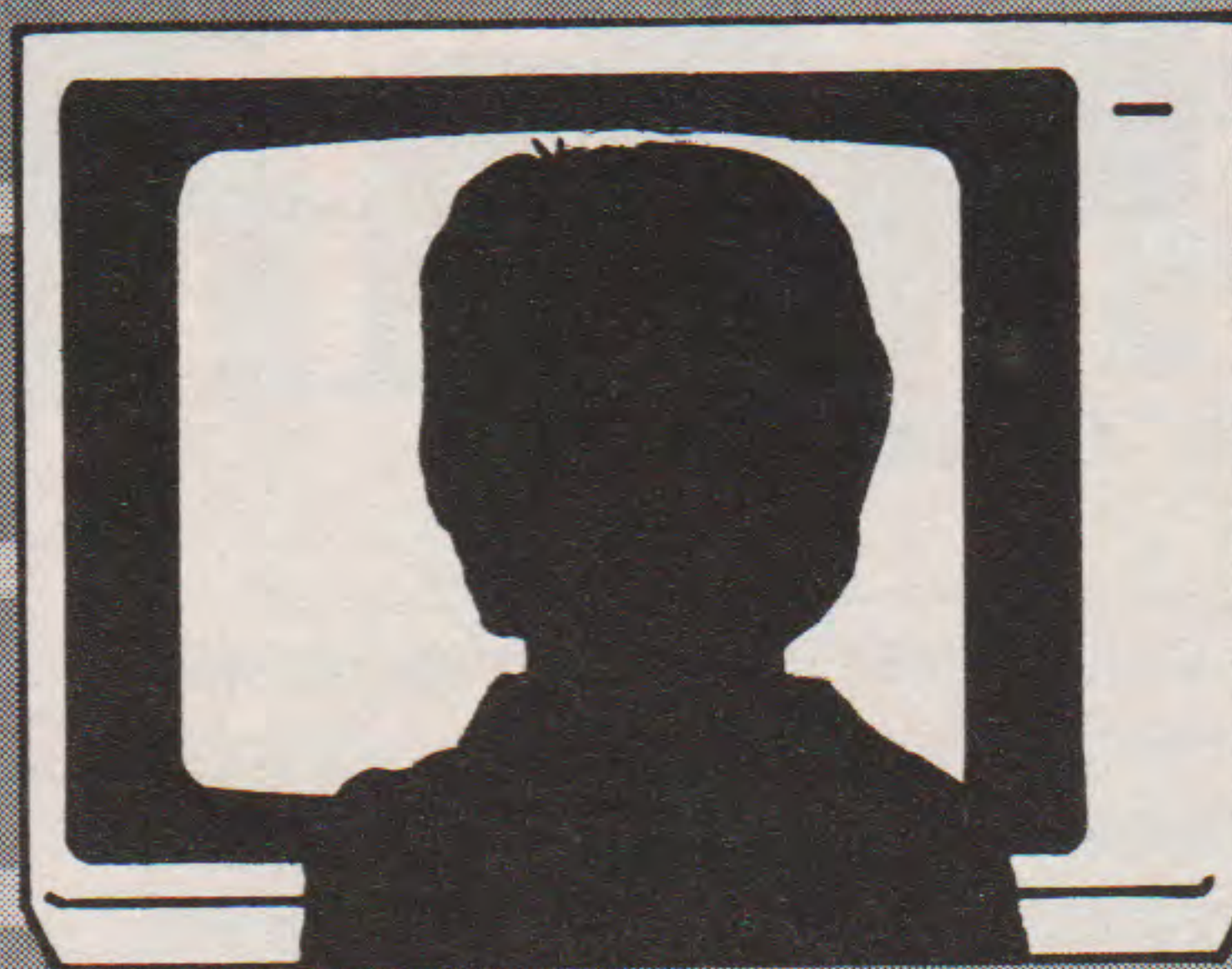
*Maria H. Goudiss
Devin-Adair Publishers
Old Greenwich, CT
160 pp., \$9.95*

This book was written for the person who knows nothing about a computer by a freelance journalist who had to be convinced to switch to an electric typewriter years ago, according to the publishers.

The author came to the word processor with the same reluctance she had when approaching the electric typewriter. However, she needed the capability that the WordStar program offered, and

(continued on page 78)

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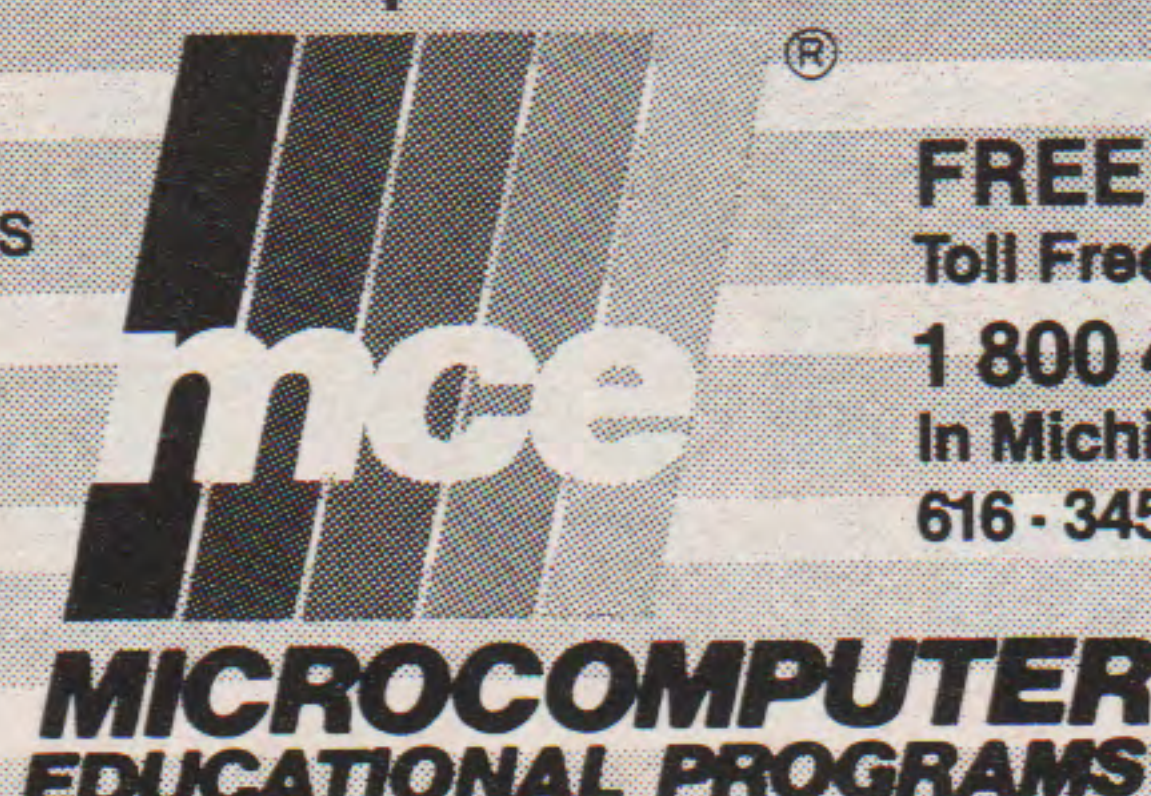
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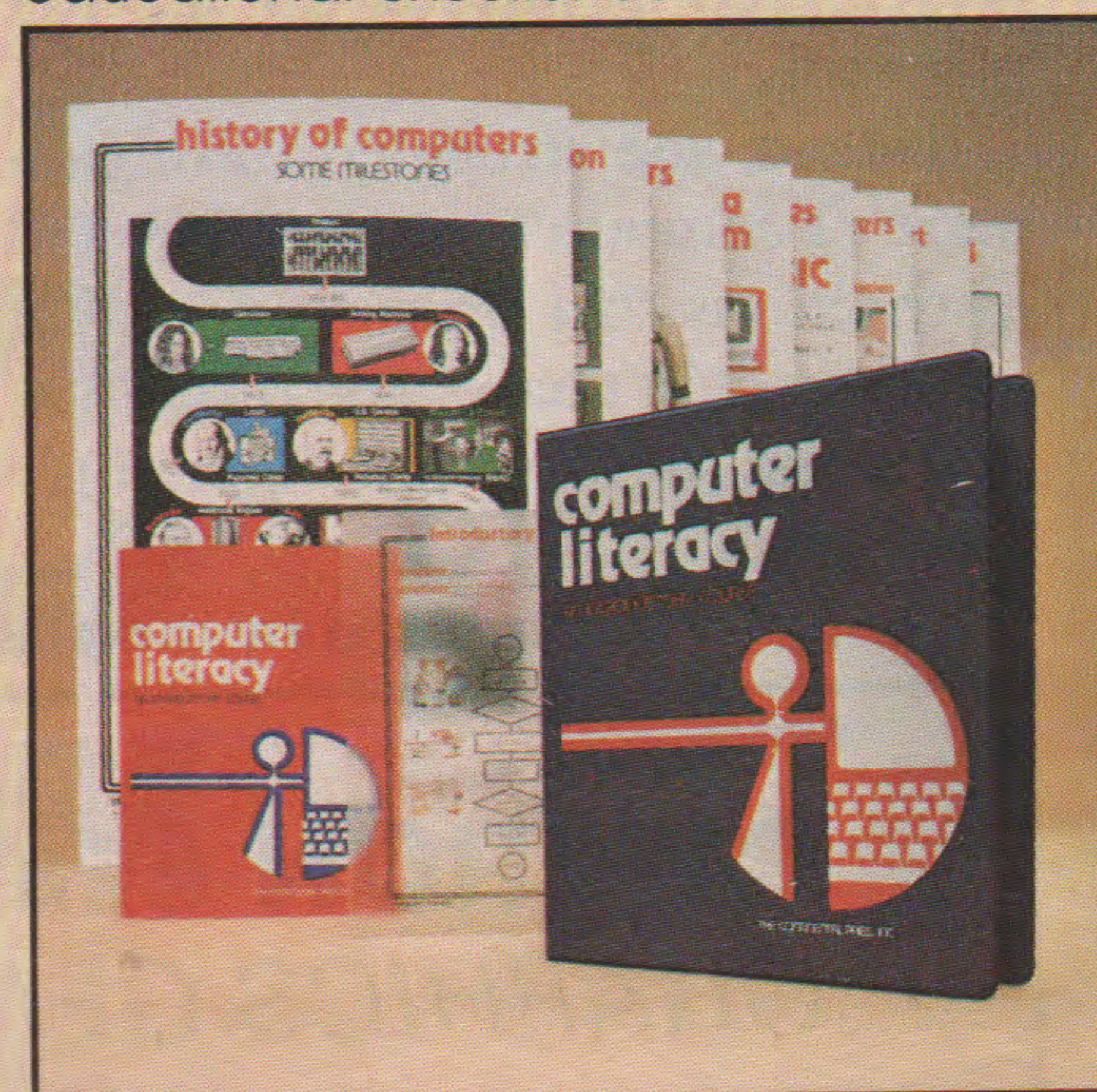
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Books *(continued)*

anticipated solutions to all her problems.

Instead, she struggled through a maze of computer terminology and instructions that presumed knowledge she didn't have. The result was this book written for "computer illiterates."

The book is organized by the job

the computer will be used for, not by computer function. For example, the WordStar manual lists double spacing under "dot operations" or "printing functions." Goudiss lists it under "double spacing."

There are no practice letters or exercises with "WordStar in Everyday English." Practice is done on the job at hand.

Write No. 705 on Inquiry Card

Building Controls Into Structured Systems

Alan E. Brill
Yourdon Press
New York, NY
168 pp., \$29

The author shows how to identify the proper controls for systems as well as how to build and document internal controls as part of the formal systems development process.

The book introduces the notion of phase-related control (PRC), a divide-and-conquer philosophy based on the concepts of structured techniques.

PRC is the process of specifying and documenting the internal controls appropriate to each stage of the systems development life cycle.

Brill provides a tool based on a decision tree that can be used to identify controls in an existing system as well as in a system under development—whether or not the user utilizes structured techniques. The foreword is written by publisher Edward Yourdon.

Write No. 727 on Inquiry Card

Computer Graphics for the IBM Personal Computer

D. Hearn & M. Baker
Prentice-Hall
Englewood Cliffs, NJ
330 pp., \$24.95

This book covers a wide range of graphics for the IBM PC, including basic graphics, display manipulation, and applications.

Methods of creating two- and three-dimensional pictures and graphs are considered, along with ways of manipulating and animating displays. The authors first discuss the IBM PC — how it works, the hardware components, options for expansion boards, video monitors, and software.

Then they provide an introduction

(continued on page 79)

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Books *(continued)*

to fundamental methods for constructing pictures and graphs in two dimensions. Instructions are given on how to create displays using the alphabet and special graphics characters.

Techniques for manipulating displays are discussed in the third part

of the book. Three-dimensional graphics are introduced in the fourth section, and applications of computer graphics in business, education and the home are surveyed in final chapters.

Graphics methods and applications are illustrated with programs written in BASIC.

Write No. 722 on Inquiry Card

Mostly BASIC: Applications for Your IBM PC, Book 2

Howard Berenbon

Bobbs-Merrill Educational Pub.

Indianapolis, IN

246 pp., \$14.95

This is a companion volume to Book 1 of the same title. This second volume contains 32 BASIC programs and is designed as a supplement for computer programming courses.

Included are fantasy games for teaching history and math; programs for saving time and money in home applications; programs for testing personal abilities, such as memory, eidetic imagery, and extra sensory perception (ESP); a fantasy game called *Dungeon of Dangers*, and programs on graphics and sound.

Write No. 703 on Inquiry Card

Discovering Apple LOGO: An Invitation to the Art and Pattern of Nature

David D. Thornburg

Addison-Wesley

Reading, MA

145 pp., \$14.95

The author uses this book to show new programmers, parents, teachers, children and artists how to explore the connections between programming and many of the principles that govern the world around us.

Thornburg uses LOGO to demonstrate elementary programming on an Apple computer. Most pages of text contain black and white computer-generated illustrations of the images he describes, along with a four-color insert that pictures the high-quality graphics the user can produce.

Thornburg uses that platform to investigate the formation of patterns underlying coastlines, mountains, and trees.

Write No. 709 on Inquiry Card



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THE CHEMISTRY TUTOR runs on the Apple II+ /Ile with one disk drive, DOS 3.3

Available October 1983

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* THE CHEMISTRY TUTOR only asks one specific question at a time, to pinpoint where the confusion lies.

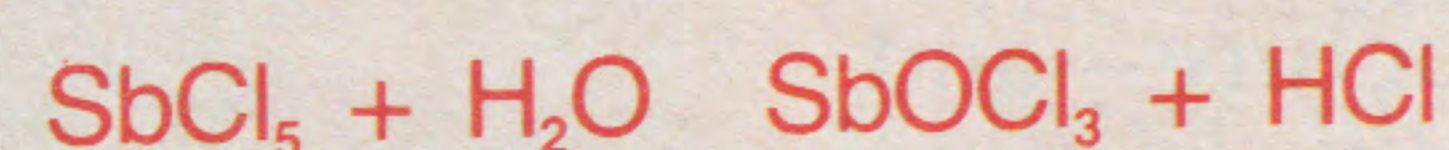
* THE CHEMISTRY TUTOR does not spoon-feed information. It supplies it one piece at a time, only as required for thorough understanding.

* The nature of the wrong answer determined THE CHEMISTRY TUTOR'S line of questioning. Had a different wrong answer been given, the questions would have corresponded to the particular area of difficulty.

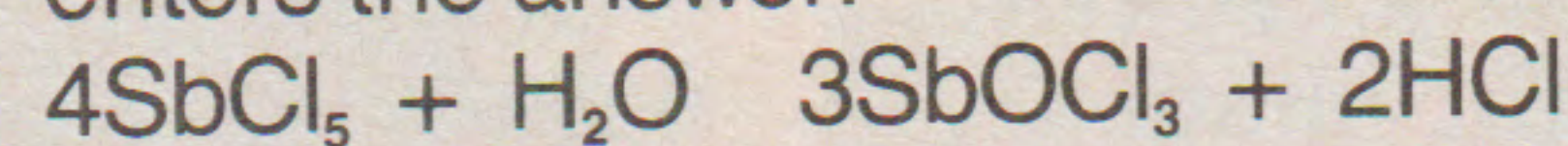
* Once the problem area has been resolved, students may proceed with the rest of the equation. But if any equation poses unusual difficulty, THE CHEMISTRY TUTOR will refer the student back to basic principles. If at any point in the tutorial the student wanted to re-submit an answer, all he or she would have to do is press the Escape key and enter the new answer.

Asks student to select from General Directions, Balancing Equations, Simple Stoichiometry, and Limiting Reagents.

Student chooses Balancing Equations



Student manipulates cursor, types in coefficients, and enters the answer:



No, that is not correct. Would you like to try again or take a tutorial?

Student opts for tutorial.

How many Sb atoms are on the left side?

9

No, that is not correct. How many Sb atoms are there in 4 formula units of SbCl_5 ?

5

No, there is no subscript following the Sb atom in SbCl_5 . This means that there is only one atom of Sb in each formula unit. The coefficient 4 in front of SbCl_5 indicates that there are 4 SbCl_5 formula units. Since each one contains 1 Sb atom, there are a total of 4 such atoms. So, how many atoms of Sb are there on the left side?

4

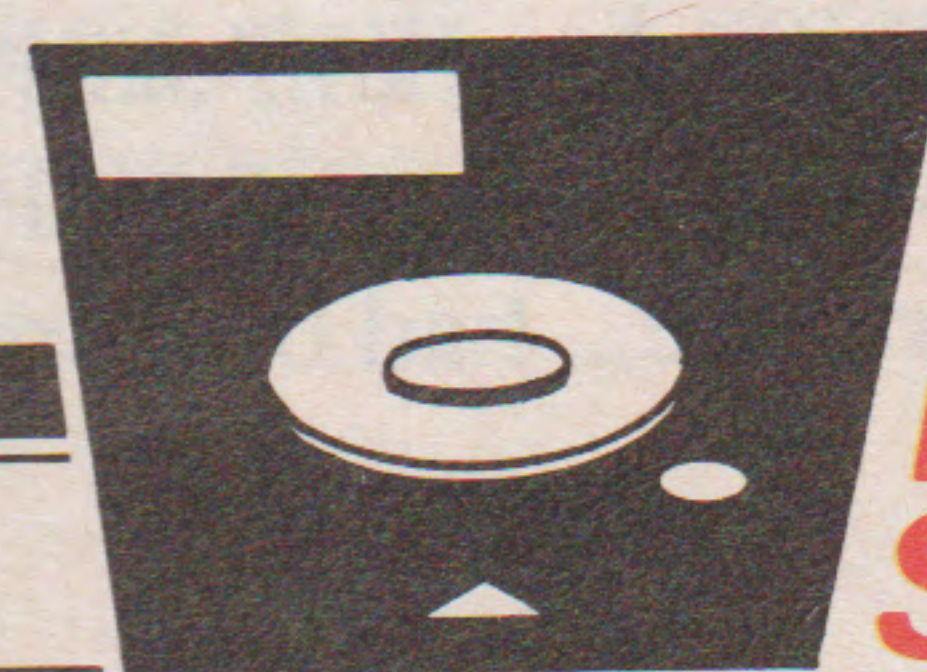
That's right. Now, how many are there on the right side?

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Write No. 3 on Inquiry Card

Applications

Students Learn English on the Typewriter

Not many youngsters come out of the third and fourth grades with a job skill; but, then not many elementary students have been exposed to programs like Project T.Y.P.E.

Teaching Youngsters Precise English (T.Y.P.E.) is being used at Marsh Elementary School in Antioch, Calif. The goal of the program, according to a spokeswoman for the school, is to allow students to explore the sights, sounds and feel of the language through the use of IBM "Selectric" typewriters.

Some 230 students in the school use the typewriters to learn the mechanics of writing—spelling, punctuation, capitalization, grammar and sentence structure—and to edit their own work.

Students Are Fast Typists

In the process, the students—mostly 8 to 11 years of age—become better typists than many adults. Some reach speeds up to 60 words per minute by the end of the program.

"I can type faster than my mom," boasted one enthusiastic third-grader. But he admitted that success has its drawbacks, adding, "Now she makes me do all her typing for her."

"Seeing their work typed on the page gives them a real sense of pride," said Project T.Y.P.E. teacher Vangie Barr. "They can see their own progress throughout the year. When they compare their work at the end of the year with their beginning papers, they can't believe how far they've come."

Willa Sawyer, formerly a Project T.Y.P.E. instructor and currently teaching fourth grade at Marsh, explained the benefits. "There are

three modes of learning: They *hear* it, they *see* it or they *do* it. In the typing class, they get all three."

Each 30-minute class begins with a typing warm-up, followed by a lesson in which words are shown on an overhead projector. The teacher pronounces the words, stressing the relationship between the way they look and sound. After dictation and a period of writing and editing, the class ends with a timed test.

A Resounding Success

The formula appears to be a resounding success. Marsh Principal William Reed recently cited the results of the California Assessment Program tests administered each year. Traditionally, Marsh student scores have been among the lowest in the eight-school Antioch Unified School District.

Last year, however, Marsh sixth-graders pulled in the highest scores in the district, Reed said. He thinks it's no mere coincidence that those



USING THE T.Y.P.E. METHOD

sixth-graders were the first students tested after going through Marsh's two-year typing program.

Reed, who developed the program, said it works well with students of all ability levels. "We haven't had one dropout, and the youngsters

have ranged from learning-disabled to gifted," he said.

He noted one advantage of the typed work over handwritten is consistency in appearance, an important factor in getting a child to recognize the word each time he or she sees it.

"When children get into handwriting, every time they write a word, it looks different," Reed explained. "That's where the typewriter comes in. The word always looks the same."

The children adapt easily to the Selectric typewriters, said Reed.

A 3rd Grade 'Type-aholic'

Burl, a third-grade "type-aholic," isn't satisfied with a mere half-hour at the keyboard each day. "I type every night at home," he said.

Many of the students—including several aspiring computer programmers, secretaries and newspaper reporters—think their typing skills will come in handy later in life. Others aren't sure whether they will type in their planned careers as soccer and football players, but say they enjoy the class anyway.

Nine-year-old Tommy seemed fairly focused on his future. "I want to grow up to be a boss," he stated matter-of-factly. And will he do much typing on his job? "No," he replied. "I'll just tell other people to type." Write No. 607 on Inquiry Card

Diskette Copier Supplies Software to 63 Iowa Schools

An educational agency in central Iowa is supplying computer software to the 63 schools it serves, thanks to the 5208A diskette copier.

The Heartland Area Education Agency #11 (AEA) in Ankeny, Iowa, is responsible for supplying supplemental teaching media to some 118,000 students and more than 7,000 teachers. With the purchase of more than 600 Apple II microcomputers, AEA's responsibility expanded to supplying software to all the schools.

Tom Hoffman, coordinator of the media production for the AEA, looked to the Minnesota Educational Computing Consortium (MECC) for software. MECC has about 80 programs developed for kindergarten through 12th grade that can be duplicated for schools.

But duplication of enough programs for all of their schools seemed too large a task to be accomplished on an Apple computer.

"Initially, we were looking at copying 5,000 to 10,000 diskettes a year and we needed an alternate system to copying one diskette at a time on an Apple computer," Hoffman said.

They found the solution in a diskette copier that connects to the Apple II. Media System Technology's 5208A automatically formats, copies and verifies 5-1/4" diskettes from user-generated programs.

At the time of purchase — last March — AEA expected the 5208A would meet all their software duplication needs. Now AEA is considering doubling its duplication capacity — with another 5208A.

"The time savings are what we expected," Hoffman noted. "The machine is much faster than one person doing the copying manually. We just put blank diskettes in the hopper and we can do other jobs while the copies are being made. An operator can make labels or operate another machine."

Their present success may lead AEA to expand its efforts to other areas. Hoffman reports he plans to get 50 to 80 programs from sources other than the MECC for duplication.

He is opening the door to software authors of education programs. Since they have the capability of duplicating in large quantities, the authors may become "published" on the 5208A and their programs distributed for use in schools through AEA. This allows the writer of the program to sidestep the \$200 fee charged by most software publishing/duplication houses.

This will widen the scope of software available to Iowa students as well as allowing them access to programs that otherwise might not have seen the light of day.

Video Disk System Simulates Medical Care, Diagnosis

Physicians, medical students and nurses in 275 teaching hospitals across the country can now keep up with the latest advances in medicine and practice their decision-making skills in a risk-free environment.

That environment is the Miles Learning Center, an interactive laser video disk system wherein health care professionals confront real hospital situations and learn new procedures.

Presented with a critical situation—such as the diagnosis and treatment of an infectious disease in a hospital, or emergency management of a seriously injured patient—the physician viewer decides how to respond, enters that response into the video disk player and immediately sees the effects of the decision.

The Learning Center's computer will point out errors and allow the user to review the situation at his or her pace and then embark on another approach.

System in 275 Hospitals

Miles Pharmaceuticals, creator of the Learning Center, has placed the center in 275 teaching hospitals across the country, in each donating the unit to the institution.

Richard E. Dixon, M.D., director of medicine at Helene Fuld Medical Center, Trenton, N.J., believes that interactive learning is the wave of the future in the healthcare industry.

"With medical technology changing so rapidly, it is vital for hospitals to train and retrain their staffs continually, especially in new areas

of specialization," he said. "The major advantage of the Miles Learning Center is its ability to simulate actual medical situations, such as rare or life-threatening events that physicians need to see but often don't until the situation actually occurs."

Disks on Ten Topics

Miles Pharmaceuticals has produced video disks on ten topics to date, including hematology, trauma training, surgical infections and preventing infection in the immunosuppressed patient.

"Our goal for the Learning Center is to provide access to high quality medical education through a unique state of the art learning system," said C. Douglas Webb, Ph.D., director of product management for Miles Pharmaceuticals. "We are committed to the development of additional educational programs such as the nine-part series on nosocomial (hospital acquired) infections."

The Learning Center's special features include: accessibility to any point on the disk within five



MONITOR SHOWS EFFECTS

seconds; slow motion, still pictures or freeze frame; two-channel audio, and a 54,000 frame capacity per disk side for film, slides and charts. Each disk also has instructions on how to operate the Learning Center.

Write No. 606 on Inquiry Card



This is the excitement PLATO quality

Announcing more new PLATO® courseware for the Apple II Plus and Apple IIe.

An extensive new series in Elementary Algebra*

This 38-lesson program supplements topics commonly taught in high school algebra. A test disk for each lesson and a comprehensive test disk for the entire series help students pace themselves through the learning process.

Through practice problems that change at random and examples of solutions, students move smoothly into: Exponents, Roots, and

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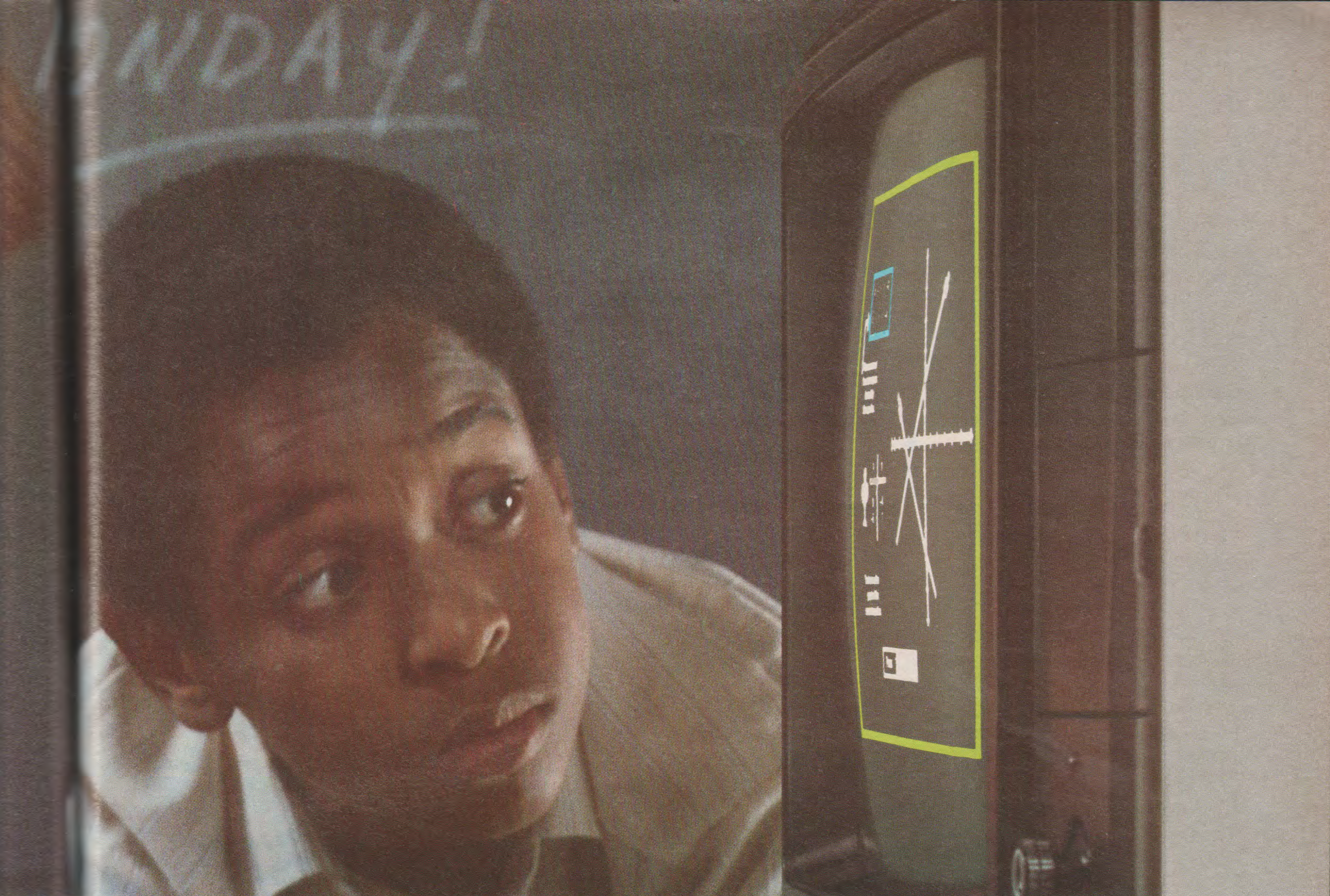
This series helps students understand how the computer works and gives them a chance to practice what they learn. Lessons include:

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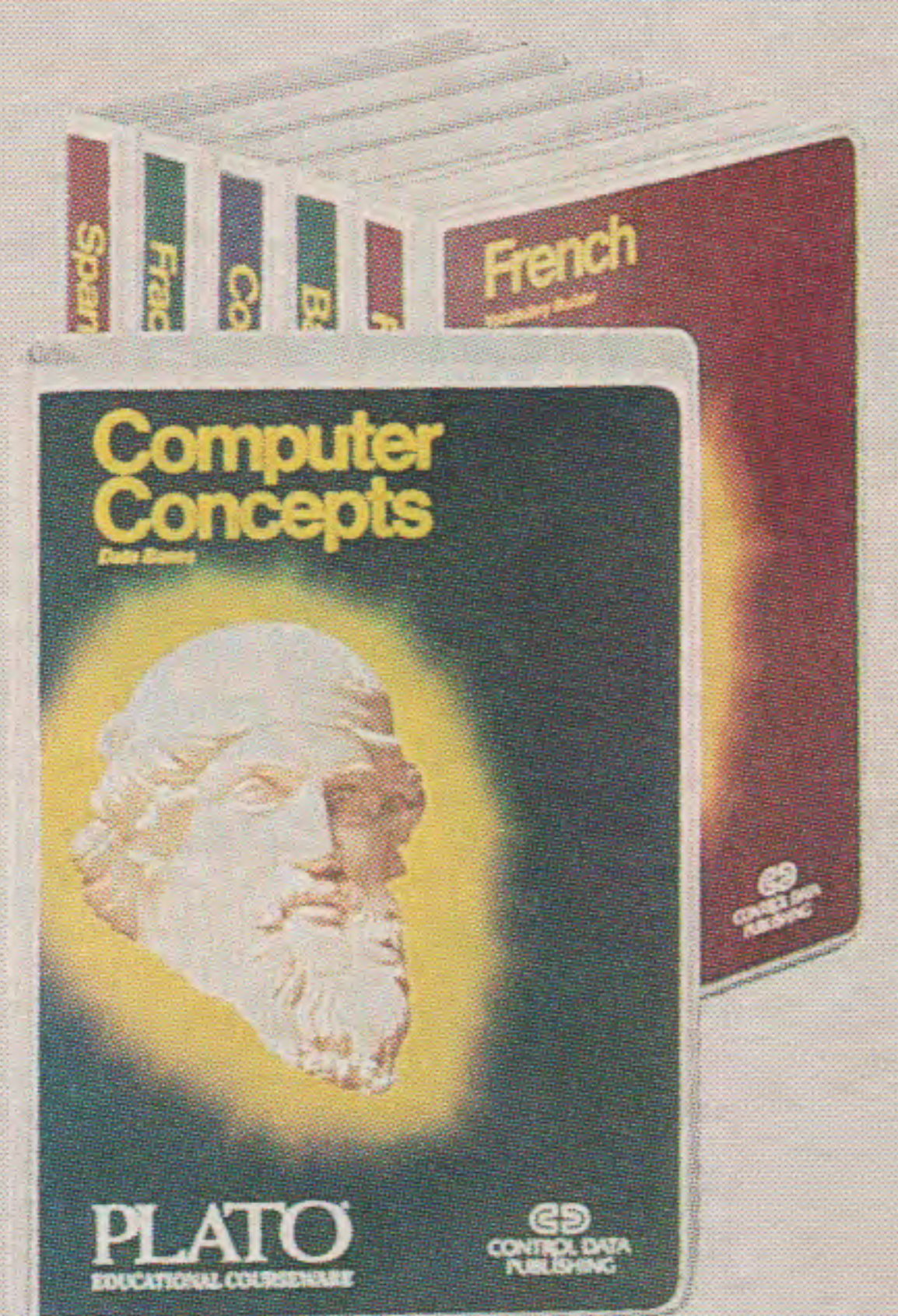
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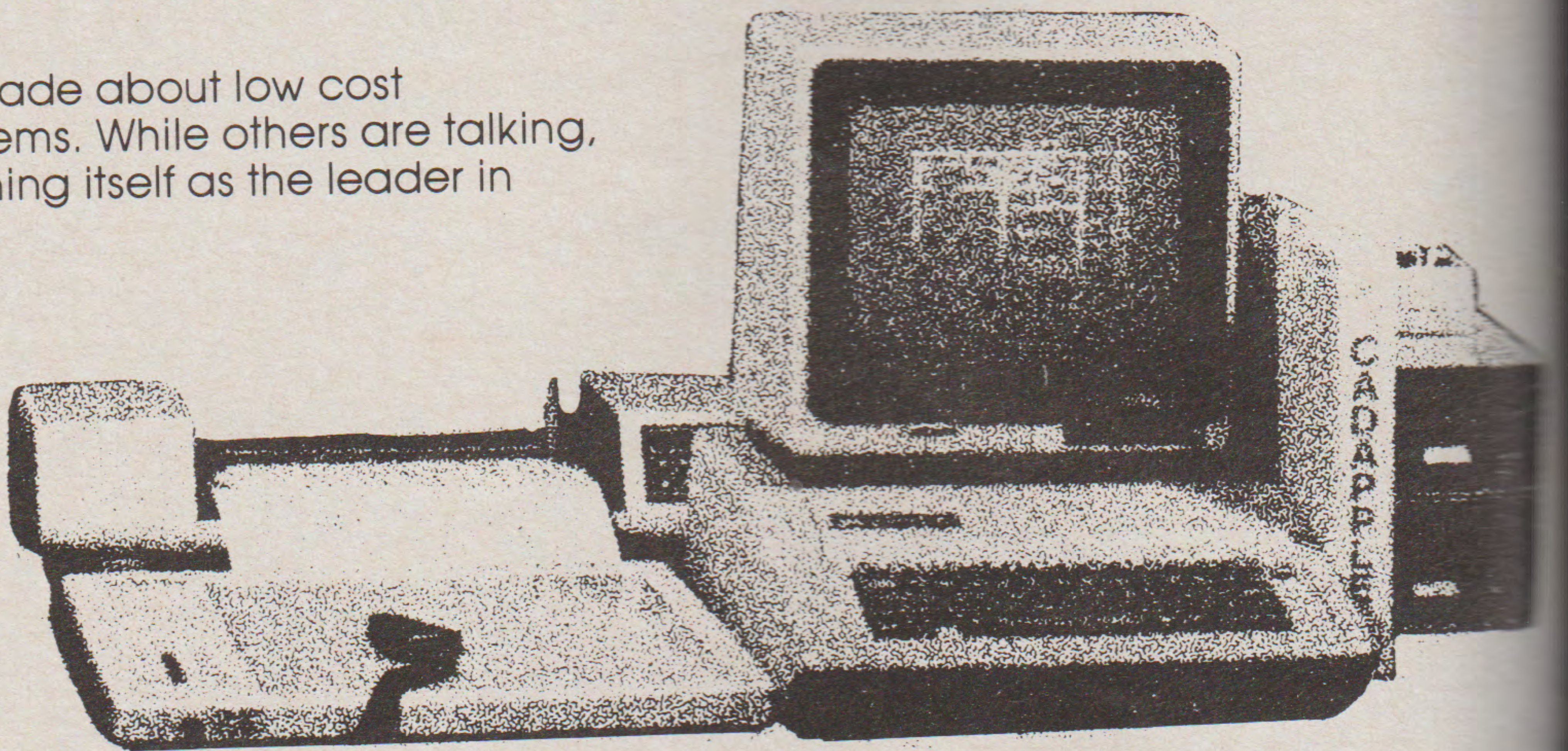


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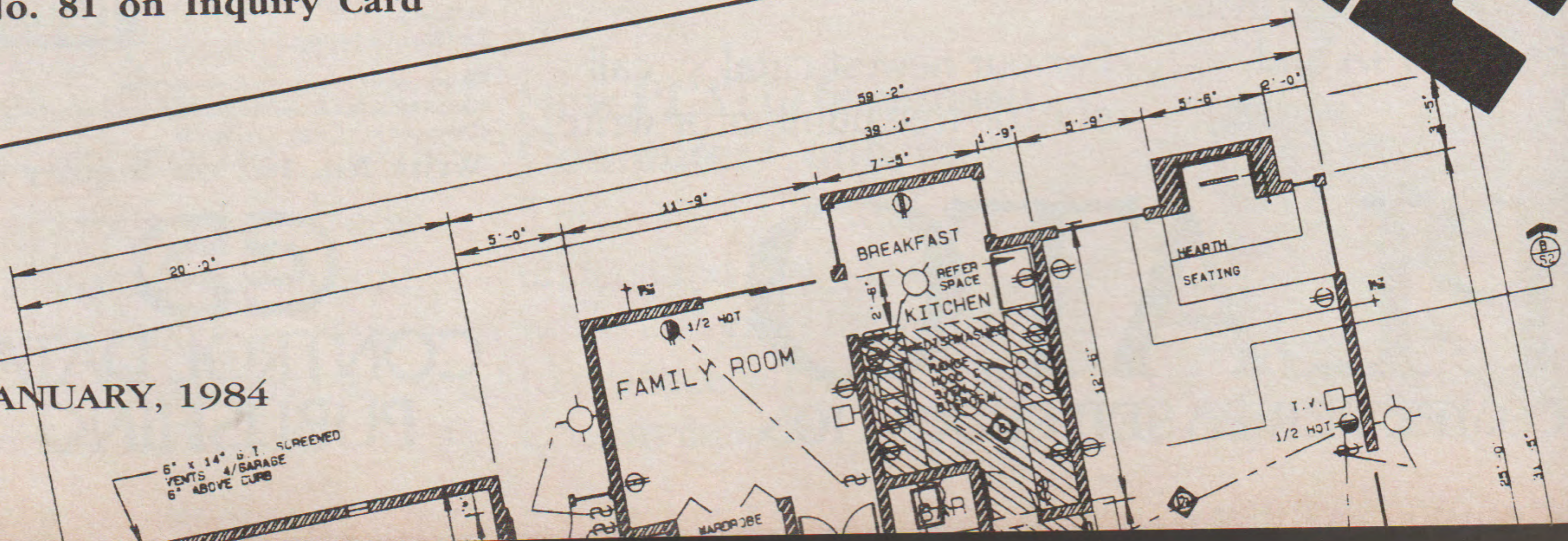
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Write No. 81 on Inquiry Card



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86 JANUARY, 1984





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Compatibility	A+	The ACE 1000 is hardware and software compatible with the Apple® II.
Software	A+	Because the ACE 1000 can run software written for the Apple II, you can select from many challenging educational packages.
Ease of use	A+	A typewriter-style keyboard and numeric pad make the ACE 1000 easy for students to learn and use.
Upper & lowercase	A+	True upper and lowercase characters are generated because we believe children should see the world as it really is.
Color graphics	A+	The ACE 1000 has color graphics capability to make learning visually fun and exciting.
Cost	A+	The ACE 1000 offers outstanding features at a price that won't stretch your budget.
Value	A+	With a standard 64K memory, built-in fan, and oversized power supply, the ACE 1000 offers more for the money.
Growth	A+	Franklin ACE computers have networking capabilities—for sharing peripherals (such as printers) and memory.
Service	A+	Franklin has more than 1,000 dealers throughout the country.

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Write No. 13 on Inquiry Card

Stanford Students Given Access to 'LOTS' Mainframe

What has 10,000 hands, but only seven feet? According to Robert M. Knight, manager of Low Overhead Timesharing Systems, it is Stanford University's LOTS, a computer system serving more than 5,000 student users while requiring a staff of only three, with another working half time.

LOTS includes 176 terminals, including 15 in dormitories. It is available to students 24 hours a day, every day. Any student or faculty member at Stanford may have a LOTS account at no charge.

LOTS gives students access to a mainframe computer with a capacity for complex programs and large storage. Interactive hands-on computing through LOTS—as contrasted with batch processing—means students learn faster; they get immediate results and can see what is taking place with their programs.

Several factors allow LOTS to run 24 hours a day with such a small staff. One is that it is easy to use and mostly a self-service system. If the user becomes confused at any point, he can request help by hitting the key marked "?". The system responds with an appropriate list of possibilities for completing the command.

Experienced students are usually willing to help neophytes, and the operating system and software for LOTS is more user-friendly and interactive than other mainframe systems. Another factor is that LOTS has been structured to give its management on-line information about current usage. One program displays current terminal and program usage by account. Another lists the total number of users on the system each day and the amount of disk space used by each account.

Idea Goes Back to 1972

The idea behind LOTS goes back to 1972. Since the mid-1960s the Stanford Center for Information Processing (SCIP) had provided batch data processing and on-line timesharing on a fee basis. John McCarthy, director of the Stanford Artificial Intelligence Laboratory, felt that all students should have access to an interactive mainframe computer for their course work. At that time McCarthy proposed a free general timesharing system.

In 1972 that was a revolutionary idea. Costs presented a serious able cost without requiring a large support staff.

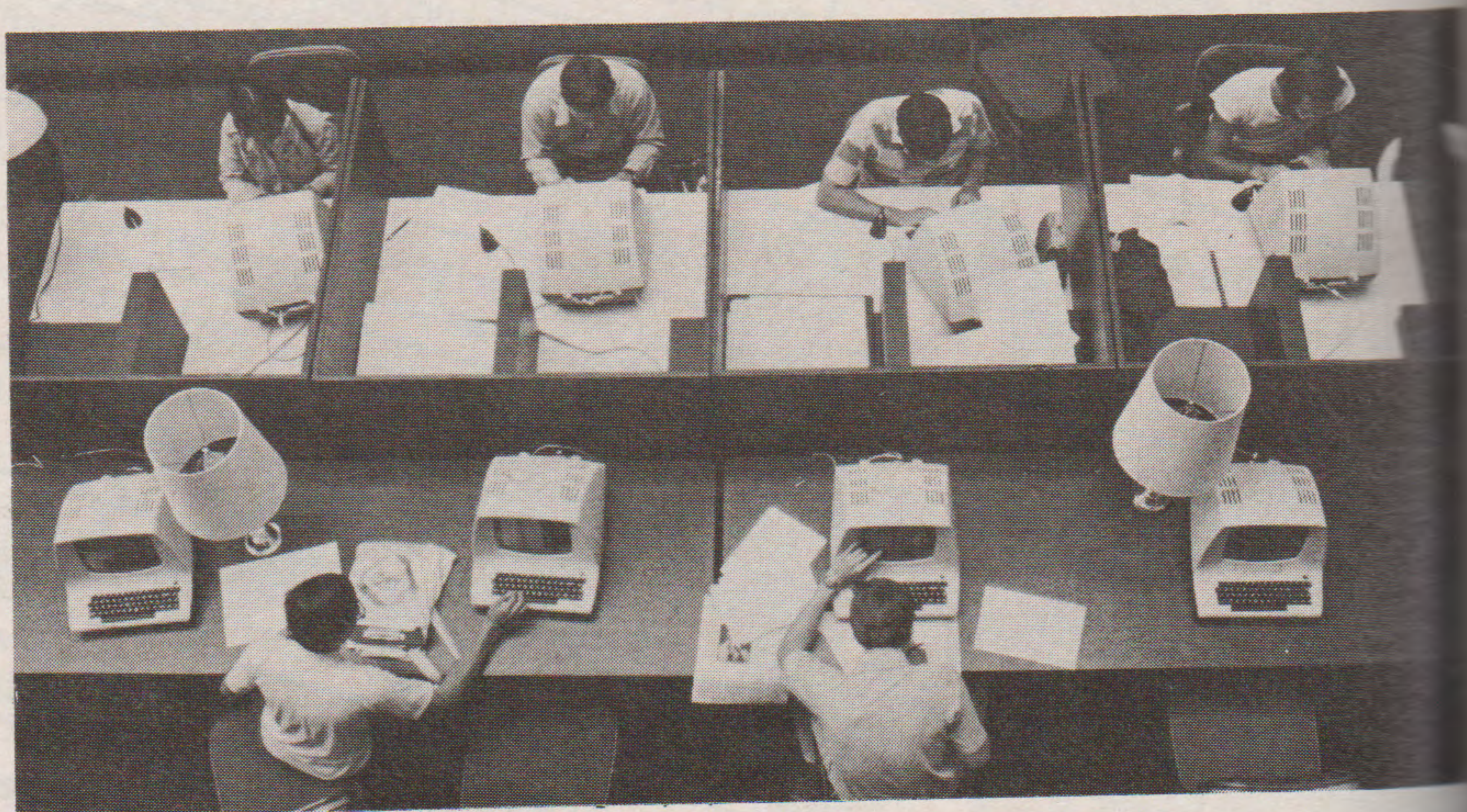
When the system became operational in January, 1977, there was some question about student acceptance. Any doubts were soon put to rest. Initially the system had 700

student users. By 1978 it served 2,000 students. With 4,000 students using the system, an additional Decsystem 2060 was installed in April, 1981.

Users Fall into Four Groups

Most users of LOTS fall into four groups. First, there are 1,700 engineering and science undergraduates who use the computer for simulation and modeling of complex physical systems. These students primarily use FORTRAN and PASCAL in their problem solving.

Four hundred and fifty social science and education students comprise a second group. They often have to analyze a large data base, such as voting patterns or test results. Using programs available through LOTS, including Statistical Package for the Social Sciences and Minitab, they can process



STUDENTS USING A FEW OF STANFORD'S 176 'LOTS' TERMINALS

problem. The problem was exacerbated when no existing department wanted nor could manage such a large-scale facility. The idea, its time not yet come, was shelved.

Four years later, in 1976, Digital Equipment Corp., announced its Decsystem 2040, a mainframe computer that could provide large-scale interactive processing at an afford-

and manipulate large amounts of data.

The third group is made up of the 1,600 students who take introductory computer science each year, and use LOTS for their course work, which consists of PASCAL programming. A fourth group comprised of 150 computer science majors who use LOTS for

advanced programming in PASCAL and LISP, compiler writing, operating systems simulation and numerical analysis.

Given access to a sophisticated mainframe computer, advanced computer science students can write complex programs in a range of languages, including LISP, C, and FORTRAN. The most talented can experiment with new languages and develop innovative software.

In addition to the users listed above, there are students who use LOTS for unsponsored research, text preparation and other unstructured activities.

LOTS' staff of three-and-a-half consists of an administrative assistant, a systems programmer responsible for answering user questions, a manager/systems programmer and a half-time director.

Write No. 603 on Inquiry Card

Computer Vandalism in Schools Thwarted by Lock-Down Device

As the number of microcomputers installed in schools across the nation proliferates, so does the concern of administrators for physical security



BOLTS TO TABLETOP

of the equipment. Prevention of vandalism is a rapidly increasing activity as schools adapt to new technology by switching from lecture hall delivery or time-share

mainframe computer systems to free-standing microcomputers.

According to both school officials and manufacturers of security devices, the problem of theft grew from a nuisance to one of serious proportions during the summer of 1983, when considerable publicity was given to the donation of Apple units to many schools.

"The criminal element became aware the micros were in public-access schools," said one assistant superintendent, "and evidently discovered the machines have good resale value on the drug market. So we now are forced to take a variety of steps to prevent further losses."

In addition to anchor pads and cable locks, one of the more popular anti-vandalism devices being used is a locking cabinet of the type produced by Doss Industries of San Francisco, Calif. Called the "Apple-Center Model 12," the metal device bolts to a tabletop and is large enough to contain the computer, monitor and two disk drives. When unlocked and open, the unit allows students to operate the computer without having to remove the security device.

In San Bernardino, Calif

The self-insured San Bernardino Unified School District in California has acquired 40 of the devices, though not quite soon enough. Each of the district's 51 schools received an Apple computer last summer. Dr. Harold Boring, assistant superintendent for administrative services, immediately ordered the security devices. But before they could be installed, five of the schools lost their newly-acquired microcomputers.

"We have a \$2,500 deductible insurance policy," he said, "so losses of micros come directly out of our budget. That's why we are installing security systems and devices." He said high school computer labs are equipped with Sonar-type room alarms, but where rooms contain one or two micros, the individual computers must be protected.

In Mechanicsburg, Pa

Computer courses have been given for the last seven years in the ten-school Cumberland Valley School District of Mechanicsburg, Pa., without an equipment loss. Charles Kadel, director of curriculum and research for the district said, however, that classrooms are "wired for sound, supported by foot and car patrols, and we still use the locking cabinets on many of our 72 Apple IIe microcomputers." The district switched from mainframes to micros four years ago, Kadel explained.

In Long Beach, Calif

Having "learned its lesson" with electric typewriters, California's Long Beach Community College District has acquired 40 of the security cabinets over the last two years, and is using them in combination with other security systems officials preferred not to identify.

(continued on page 92)

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farther than just software and hardware. It integrates the BBC Micro, educational courseware, lesson plans, workbooks and other teacher support materials. Acorn's courseware is reviewed against rigid standards developed by our national panel of educators. Acorn is the only company working this hard to make education this easy.

If you would like to further your education about the first computer created in a school, write Acorn Computers Corporation, 400 Unicorn Park Drive, Woburn, Massachusetts 01801, or call toll-free 1-800-225-8001.

ACORN COMPUTER

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Write No. 20 on Inquiry Card



Applications (continued)

District spokeswoman Martha Lien said schools there had an unspecified number of typewriters stolen a few years ago, "so when we began to install microcomputers, we immediately added protective devices and systems. We're doing quite well now."

In Southborough, Mass . . .

For Richard Griffin, director of school media centers for a group of eight schools in and around Southborough, Mass., having been a "latecomer in offering a computer curriculum" has been a benefit. Combined with his experiences visiting several trade shows, he said he knew physical security was a

must as soon as microcomputers were installed.

In the eight school buildings under his jurisdiction, 32 of the 40 micros are housed in Doss cabinets. "Though we wanted to prevent tampering and vandalism," he explained, "we were concerned about the students being able to use the machines while they were kept secure. The locking cabinets answer both needs, and so far, we've not had a [loss or damage] problem."

WHAT DO ALL THESE PERIPHERALS HAVE IN COMMON?



They all interface to the ATR8000.

The ATR8000 is an extremely versatile Z80A microcomputer that runs all of the above peripherals. You can connect it to an ATARI computer or to an RS-232 terminal. It runs both 5¼" and 8" disk drives, both serial and parallel printers, and a modem. It comes with 16k or 64k RAM; the 64k model includes double density CP/M 2.2. When connected to an ATARI, the 64k ATR8000 runs ATARI DOS and CP/M, and it even has a 48k ATARI DOS printer buffer. And better still, the 64k ATR8000 runs CP/M disks from other computers.

Because some students learn faster than others and because they need to be able to keep learning, the versatility doesn't end with the 8-bit processor. Add CO-POWER-88, SWP's 8088 coprocessor with 128k or 256k RAM, and also have 16-bit processing with CP/M-86 and MSDOS, complete with IBM-PC emulation.

You can't afford to not consider the ATR8000 and CO-POWER-88 in your computer budget. You can build versatile systems that will give students access to three distinct processors, the 6502 (ATARI), the Z80A (ATR8000) and the 8088 (CO-POWER-88), and all processors can use the same disk drives and other peripherals. But best of all, they're affordable.

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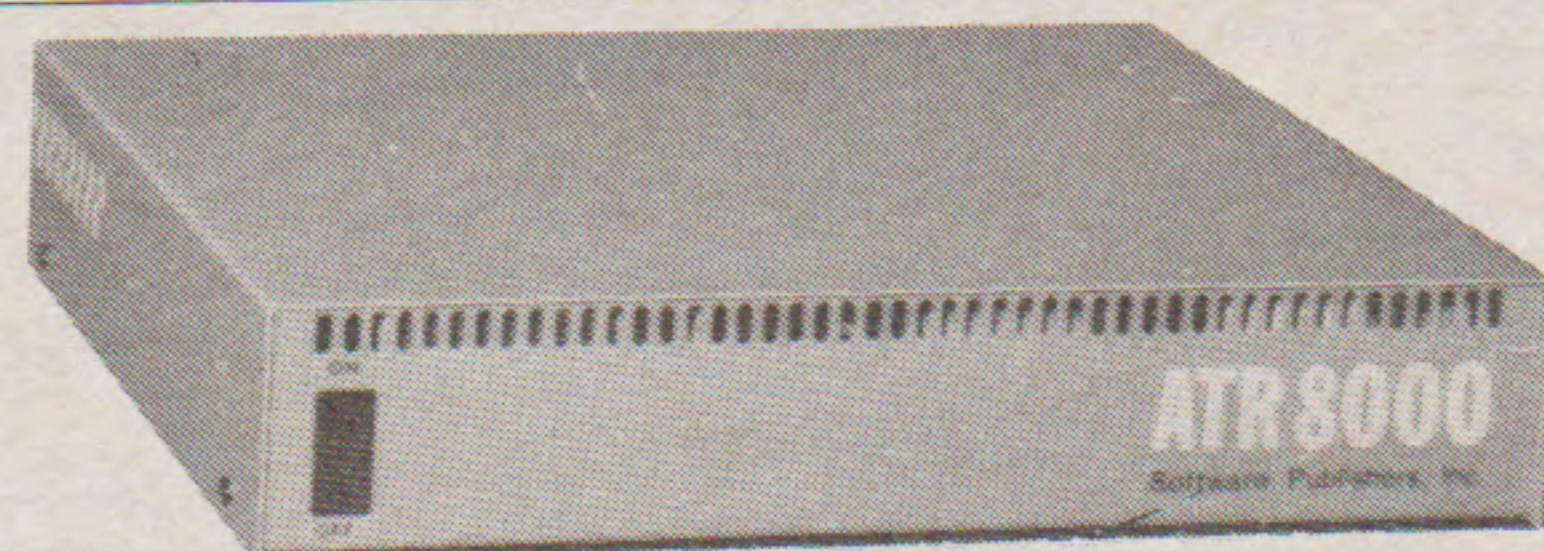
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Write No. 80 on Inquiry Card

Security Suggestions

Mass media attention has turned California's Dr. Boring into something of an authority on microcomputer security in schools. He said other school districts "look to us for advice," and offered three suggestions:

(1) "Security mountings, such as those made by Doss, are important for daylight hours. They're really very good for that purpose.

(2) "The locking cabinets should be joined by what we call our 'Marring Program'... we deface the exteriors of the computers with paint, stencils and engraving. A computer that no longer looks new has less resale value for the criminal.

(3) It usually takes a combination of things — physical devices, electronic surveillance and human watchfulness — to maintain security, especially where there is a significant drug culture."

Write No. 609 on Inquiry Card

Community College Offers CAD Program

The success story of the community college has been one of the highlights of American education. Originally tasked with providing additional educational opportunities on a local level, these colleges have grown in enrollment to rival the largest universities. Many observers feel that the success of community colleges has been their ability to quickly respond to their communities' needs.

(continued on page 94)

The solution to standardized test scoring.



The PCMark system

Cognitronics OMR/25 and the IBM PC.

Problem

- "It takes 2-3 weeks to get back our results from test scoring services."
- "I'd like to have some say in the kinds of output reports that are available."
- "We might be able to process answer sheets, but we'd still have to send the booklets out."
- "I've thought about in-house test scoring, but I'd need a computer staff for that."
- "I guess I could never get a complete in-house system to scan, analyze and print reports at an affordable price."
- "But our needs don't end with test scoring."

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The PCMark system can process CAT® 11C* booklets, for example, at well over 150 booklets per hour.

The PCMark system is completely turnkey. A demonstration will show you just how easy it is to use.

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Applications *(continued)*

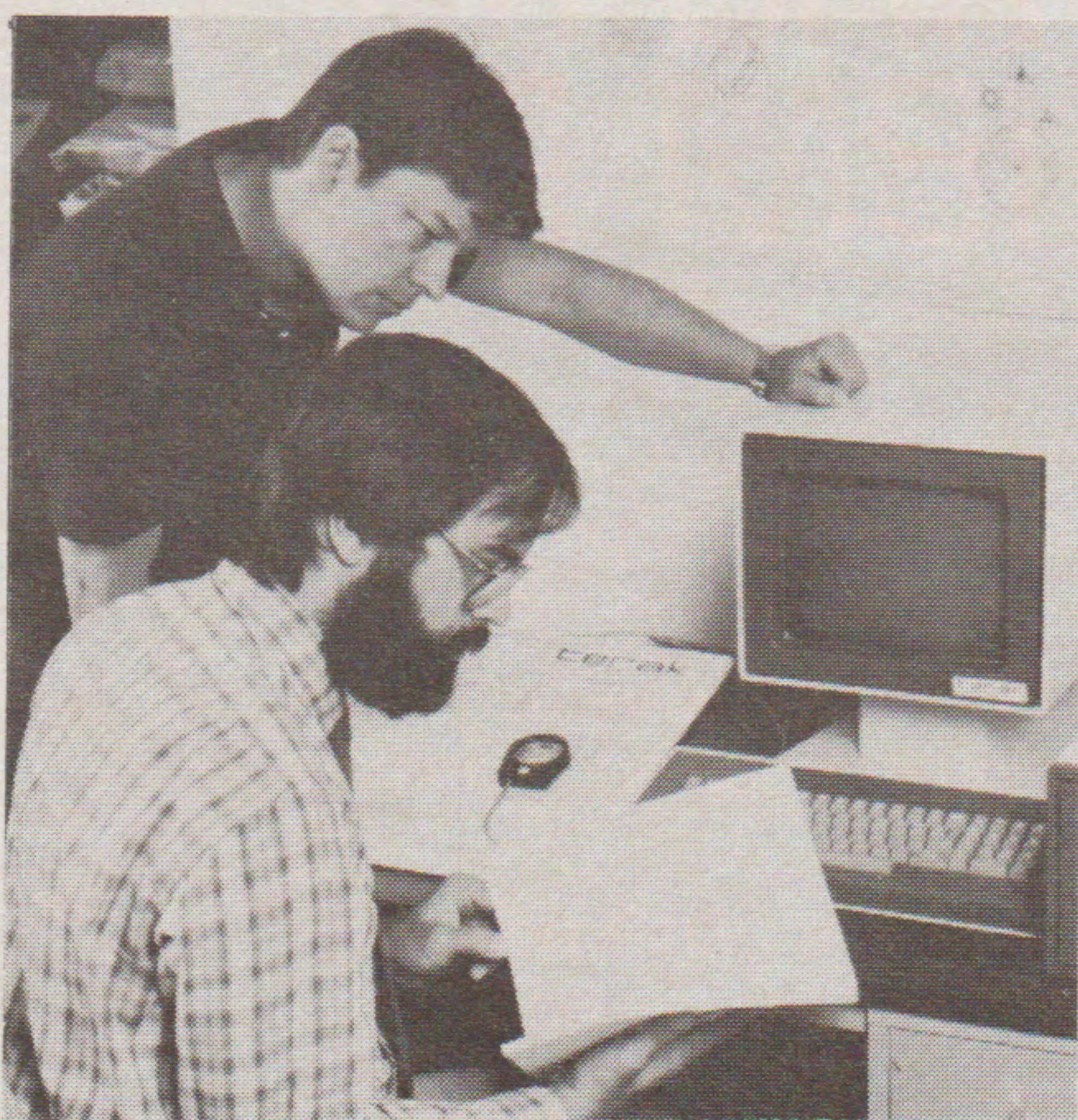
One example of how a community college has responded to the rapidly changing needs of its students is the drafting program provided by Glendale Community College (GCC), in Glendale, Ariz.

With an enrollment of more than 13,000 students—part of the third largest community college district in the nation, serving more than 60,000 students—GCC is concerned with preparing students to meet the needs of industry.

Trend is Toward CAD/D

"We studied trends in American industry in those areas where we offer instruction. We recognized the shift from traditional board drafters to Computer-Aided Design/Drafting (CAD/D) trained operators," said Dr. Larry Christiansen, administrator of the program.

GCC's selection criteria in the choice of a CAD/D system included: low-cost and high quality; total support services; training, and courseware. It had to be easy to



STUDENTS STUDY 3-D MANUAL

learn, yet provide the students with the knowledge required by future employers.

"We looked at a lot of systems," Christiansen said. "Our first option was the popular home computers, because of their low prices. But we found that the initial low price rose drastically by the time we put together the system we needed. We also were unable to find software

to match the needs of our students. And the manufacturer support we required was non-existent.

"We then began looking at the systems the professionals used, and after examining the leaders, we chose to go with the Terak application of its MINN-DRAFT CAD/D system."

Dr. Christiansen worked with a sales executive at Terak. He found that Terak's technical writing department had already created complete courseware to support the system. The courseware consisted of fully-illustrated guides for both instructors and students, lesson plans, lecture material, performance criteria, exams and lab exercises.

Three Dimensional System

Terak provided complete instructor training for the college's staff. The heart of the system, as far as Dr. Christiansen was concerned, was the three-dimensional MINN-DRAFT program. It was designed to teach the basic functionality of large industrial CAD/D systems, and includes features such as a full-dimensional data base. This feature allows students to conceptualize objects in three dimensions, then rotate their designs for industry-standard views.

MINN-DRAFT was developed by Donald Riley at the University of Minnesota to enhance traditional engineering coursework. The result was a program that turns a low-cost graphics computer into a three-dimensional drafting system. Once the students create the object and display it on the screen, it can be modified, rotated, enlarged, captioned, dimensioned, stored and retrieved. Riley developed the program on the Terak 8510, a low-cost stand-alone graphics computer.

The CAD/D at Glendale has been developed to give its students not only the kind of CAD/D instruction required to make them competitive in the marketplace, but to provide a transition education for those stu-

dents going on to engineering degrees at four-year colleges and universities.

Dr. Christiansen's philosophy about community college education is that it extends downward as well as upward. "We are working with high schools as well as the colleges," he said. "CAD/D can start at the high school level. We are helping set up a CAD/D lab at Deer Valley High School in north Phoenix and have been working closely with the school district."

Glendale is also very interested and involved with robotics and videographics. "We also observed the growing importance of robotics in education. We're installing a robotics package on the Terak to ensure that our students are familiar with this development when they go to work," said Christiansen. **Write No. 601 on Inquiry Card**

Navajo School Using CAI System

Wicat Systems, recently announced the installation of a System 300 at the Montezuma Creek Elementary School on the Navajo Reservation in southern Utah. The purchase and use of the System 300 during the 1983-84 school year is one of the two government-funded grants intended for research and experimentation in meeting the needs of Indian students through computer-aided instruction (CAI).

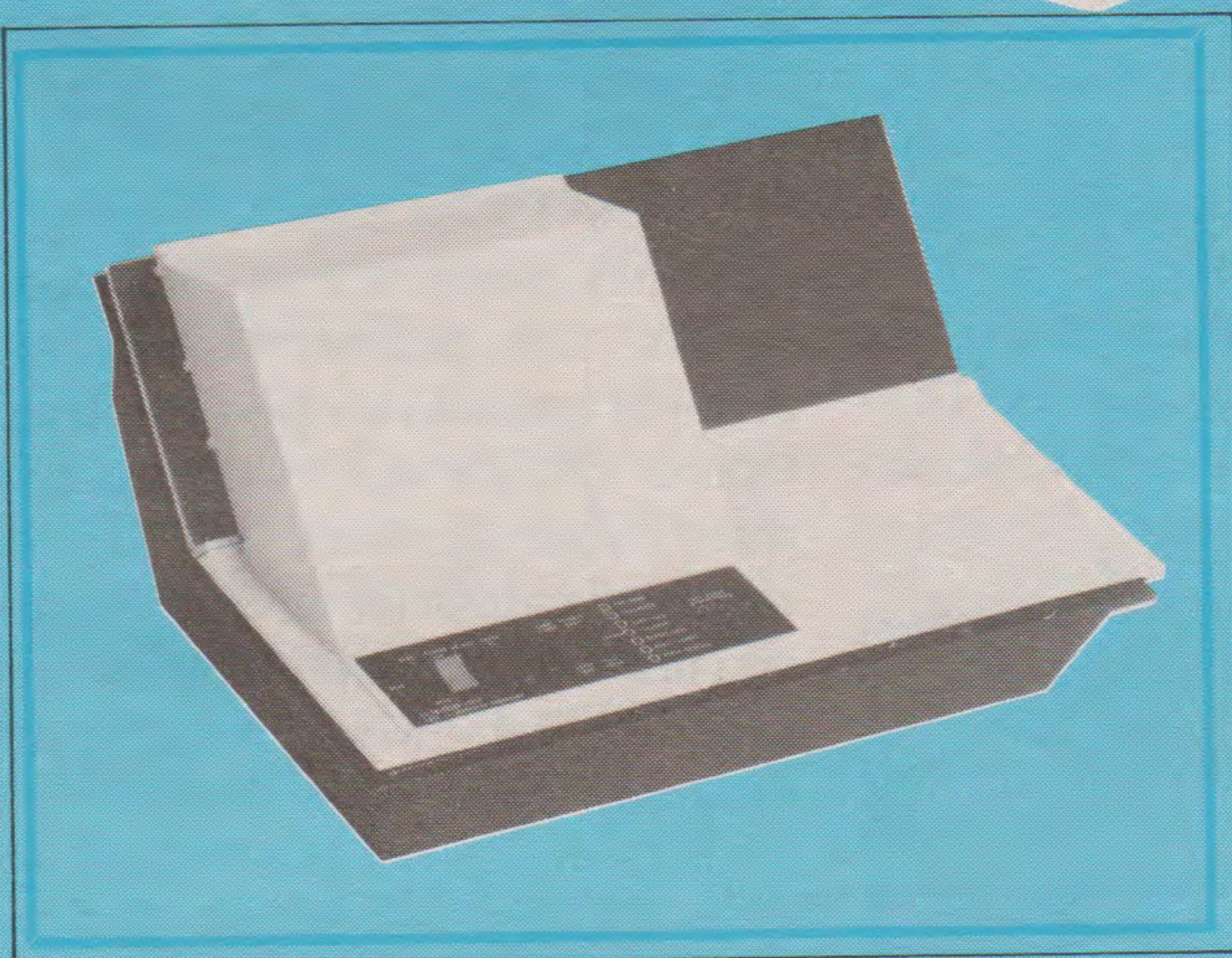
Under the first of these grants, the U.S. Department of Education provided a three-year grant to Indian Affiliates, Inc., a "Buy Indian" management consulting firm, to develop and evaluate CAI in basic educational subjects for Indian students. Wicat Education Institute, a non-profit CAI research and development organization, is a subcontractor to Indian Affiliates in this effort.

The Department of Education has currently allocated \$322,000 for

(continued on page 95)

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Applications *(continued)*

the first two years, and it is anticipated that approximately \$500,000 will be appropriated for the third year.

Students Initially Tested

To prepare for the reservation experiment, the institute tested small groups of Indian students last spring and summer. Elementary level students were tested on Wicat's math, reading and learner profile curriculum.

The children had an initial orientation with their parents and then were observed three times a week for an hour a day, to detect any attraction or aversion to using computers, and to observe their ability in mastering CAI lessons.

Three conclusions were reached. First, a very high percentage of the Indian children did enjoy interacting with the terminals; secondly, student instructions needed to be more detailed, and finally, some students previously considered to have learning problems proceeded at a pace above normal when working with the computer.

Under the second grant, the San Juan School District and the Utah Division of Indian Affairs allocated



NAVAJOS USE SYSTEM 300

\$172,000 for the purchase of the Wicat System 300 which will be used at the Montezuma Creek Elementary School. The System 300—specifically designed for education, with 30 high quality audio, animation, and graphics terminals—was installed in the elementary school in September.

Math and reading courseware (kindergarten through sixth grade)

will be the first topics introduced to the Montezuma Creek students on the System 300. Teachers were given training in operating Wicat's educational system coupled with directives for combining CAI with classroom lessons.

At the conclusion of the school year, an evaluation will be given to the federal and state departments regarding the first year's events. According to the San Juan District's Superintendent Don Jack, "We hope to expand Wicat CAI and System 300 usage throughout our school district."

Write 602 on Inquiry Card

Computer Courses Matched to Needs of Local Business

For generations of Americans vocational education meant shop classes and woodworking. For students at Benton Harbor High School in southwestern Michigan, "Vo-tech" has moved into the age of high technology.

In the 1980s, high technology is generally perceived to mean computers. The Benton Harbor Area Schools embarked upon the transition to vo-tech and high-tech more than a year ago with the establishment of industrial advisory boards and internal curriculum committees to set the framework for the vo-tech program.

In September of 1983, the Benton Harbor Area School District, through its Vocational Education Department, began offering the first of a planned series of computer application programs designed to prepare students for today's job requirements. "Perhaps, more importantly, to prepare students for the job opportunities of local industry," said Paul Bergan, district coordinator.

The school district's philosophy on vo-tech courses, according to Bergan, is to first target major local industries that would eventually be employing the graduates of vo-tech courses and then involve those

industries in an advisory capacity in setting up the courses.

Industries Targeted

Two major industries targeted by the Benton Harbor Vo-Tech program are Heath Company and the Whirlpool Corporation. Both are from the Twin Cities area of Benton Harbor and St. Joseph, Mich. The computer used by the companies and selected for the Benton Harbor High School course is the Zenith Data System's Z-100 model desktop computer. The 16-bit, Z-100 model business computer is used extensively in the administrative departments of both companies.

Ron Griffin, supervisor of information systems at Whirlpool, assisted the school district in its selection of the Z-100 system for the courses as well as the business applications software to be taught. "The computer courses being offered through the Benton Harbor Vocational Education Center are aligned with the computer applications of the Whirlpool administration center," he explained. "Students are working with mainstream software packages that will allow them to springboard into jobs in industry."

The choice of the computer selected was doubly appropriate for Heath because, not only does the company use the Z-100 in its offices, but also manufactures the computer for Zenith Data Systems, both being subsidiaries of Zenith Radio Corporation.

"One of the real benefits in the way we've approached the set-up of the computers is that the Z-100 computers selected use the same type of computer software as the IBM PC," said Bergan. "Since both computers are widely used in business offices across the country, our students are not only being prepared for local jobs, but also for jobs in a wide range of industries outside of our Twin Cities area."

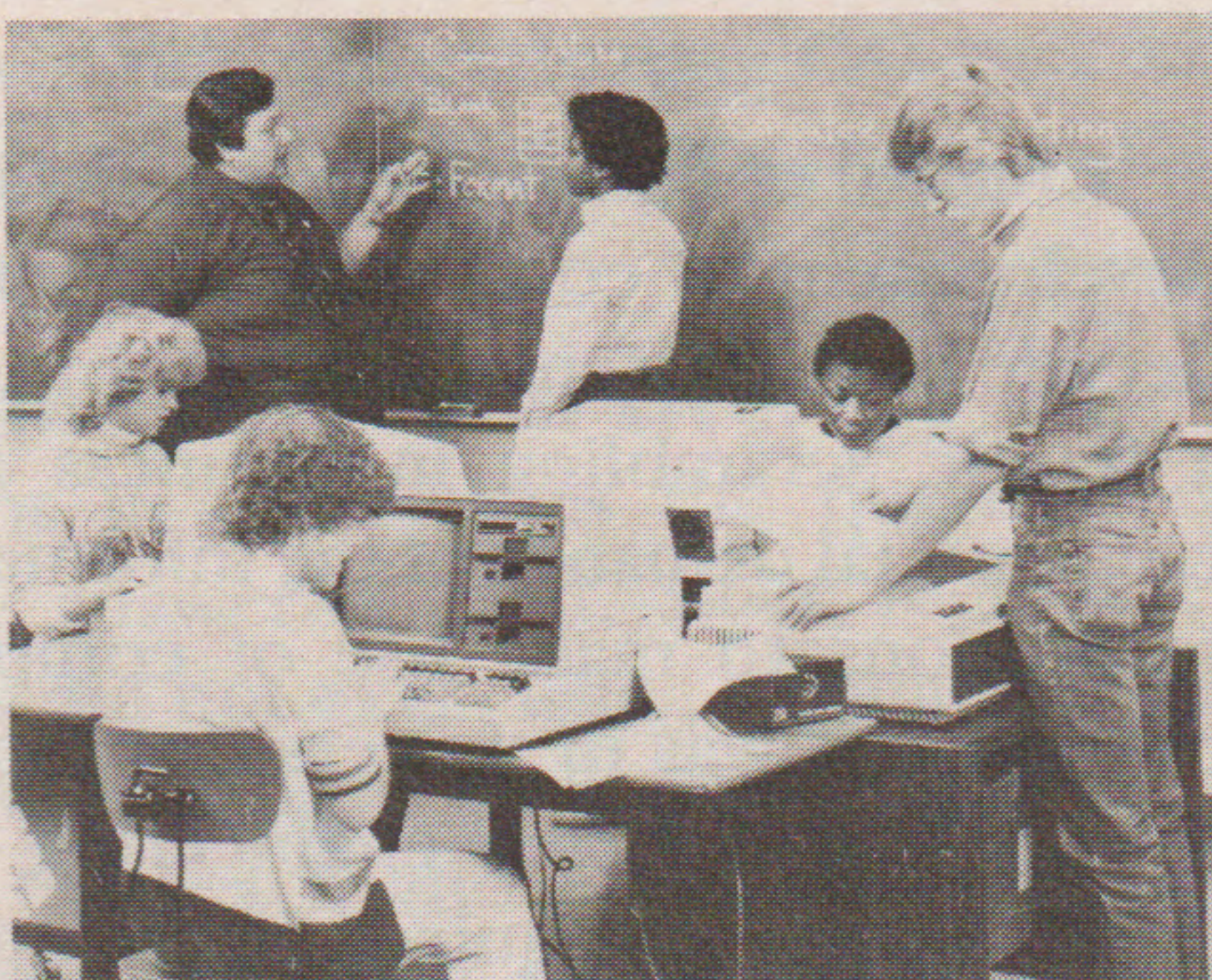
Excellent Cooperation

Dr. James Hawkins, superintendent of the Benton Harbor Area Schools, said the cooperation

received from local industry in setting up the courses has been excellent.

"Business and industry are really untapped resources for acquiring the type of expertise that is required to make hi-tech vocational education courses current," the district official said.

"Our district plan is to expand this cooperation with the private



COMPUTERS FROM LOCAL BUSINESS

sector to a much greater degree including the establishment of addi-

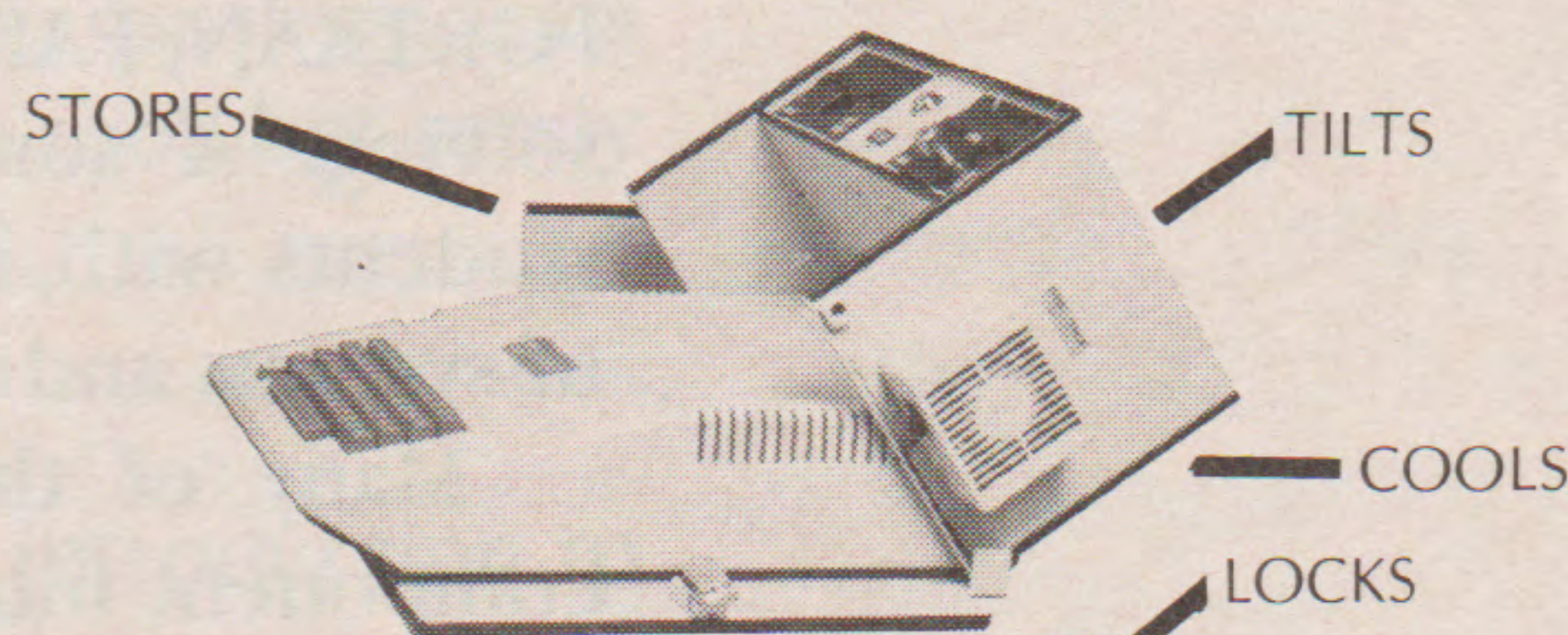
tional courses and cooperative work-study programs."

The Benton Harbor district is looking to add two courses to their current vo-tech curriculum. They are: computer programming in COBOL, a high-level programming language used in business, and computer-aided drafting.

A measure of the success of the Benton Harbor program can be found in the statistics kept by the state of Michigan for students graduating from vocational education programs. Measured on a standard of whether a vocational education graduate enters the workforce, goes on for additional training in college, or enters the military, the Benton Harbor Area schools have a placement rate of 86 percent for vocational education students, in comparison to the state average of 70 percent.

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Write No. 86 on Inquiry Card

Teaching Computing Across the Curriculum: A Canadian Viewpoint

by CHRISTOPHER K. KNAPPER
and BARRY L. WILLS

University of Waterloo, Waterloo, Canada

Waterloo began with familiar computational applications.

Control of information has always implied power. But the astonishing development of computers and information technology during the past decade has threatened a redistribution of power and influence and caused a frantic scrambling in business and industry to keep pace with the commercial demands of the information society. Universities were the first institutions to make use of computers on a broad scale for research purposes. It was in universities too that students — mainly in computer science and electrical engineering — learned the software and hardware skills that were required by commercial users of the new information technology. It has gradually become apparent, however, that the computer is such an all-pervasive influence on contemporary society and on people's day-to-day lives that an understanding of the relevant technology cannot be left in the hands of specialists. Put more colloquially, computing is too important to be left to the programmers and technicians.

Teaching and Computing: Approaches and Issues

The University of Waterloo is a successful, technologically sophisticated institution that has had a longstanding emphasis on the use of computers in both its research and teaching programs. This does not mean, however, that there is a consensus at the institution about how best to teach computing or what computing skills are relevant for students in many different disciplines. Indeed, this is an active topic for debate within the university.

As with many other universities, computing at Waterloo began with familiar computational applications. For mathematics students, considerable emphasis was placed upon learning programming languages, such as FORTRAN, PASCAL, or COBOL and on the use of computers for problem solving. A somewhat similar approach was adopted for engineering students with, in some cases, the addition of languages for the simulation of systems and techniques for computer graphics.

Many of the social science departments introduced a computing component into their required statistics courses. Until fairly recently the emphasis on teaching has been on how to "do" computing (programming use of statistical packages). More recently, however, there has been a concern with teaching students about computers and information technology. The earliest courses of this kind were in the faculty of arts, but other faculties have followed suit.

Two other computer applications should be mentioned here, although they do not for the most part form part of the official curriculum at Waterloo. These are word processing and data retrieval. The university makes available a mainframe-based word processing system that is accessible through any of the many terminals located throughout the campus. A version of the program is specifically tailored for the preparation of student theses and reports, and is widely used by students from all

A mainframe-based word processing system is widely used by students from all faculties.

faculties, nearly all of whom teach themselves the system, or learn it from a friend. Somewhat similar informal learning methods are used by students who wish to access the various data banks that exist at Waterloo. These range from specialized data sets in the social sciences to an on-line catalog of the entire university library collection.

Learning computing skills (both formally and informally) and learning about computers are commonplace at Waterloo. A much less common application is the use of computers to teach other (non-computing) types of subject matter: what is known variously as computer-assisted instruction, computer-aided learning, computer-based education, and so on (for simplicity, we shall use the abbreviation CAI in the rest of this article). While Waterloo has experimented with CAI in a variety of formats and disciplines and has been active in developing and evaluating CAI systems, so far the impact of CAI on the teaching and learning practices in the university has been miniscule.

Appropriate Computing Skills and Computer Literacy

When computing was first taught in universities the question of appropriate computer skills virtually answered itself. Since high level languages and "off the shelf" packages did not exist, using a computer for even the simplest purpose required the writing of a suitable program in a computer language which required that each and every operation be separately articulated. Hence teaching computing meant teaching programming at a very detailed level. Partly for this reason, courses in computing were primarily confined to students in mathematics, engineering, and the social sciences which used statistics. The legacy of these early days remains with us in the sense that teaching programming skills remains a major component of computer courses in many universities, including Waterloo.

There are, of course, now that a wide spectrum of computer languages is available, major differences of opinion about the most appropriate programming language for students in different disciplines, though FORTRAN, PASCAL, and COBOL are still preeminent, especially in engineering and mathematics, and there is some teaching of BASIC to students outside these technical areas. A more provocative question concerns the usefulness of training non-computer science students to become sophisticated programmers. For example, if we try to forecast the skills that graduates will need after leaving the university, it seems quite plausible that programming will be dealt with by a small group of experts (probably with training in computer science), and other professionals (engineers, economists, planners) will use computers as a tool, but rarely write complex programs themselves.

Many Disciplines Overburdened

It is impossible to give all students a comprehensive introduction to the many facets of computing. Already the undergraduate curricula in many disciplines are overburdened; furthermore the range and types of computer applications are changing so rapidly that knowledge and skills can become obsolete virtually overnight. This implies that universities must try to identify the computer-related skills that students will need after they have left the institution, and use this information as a starting point for instruction. Moreover, students must learn the fundamental concepts of computers and communication systems in a manner that provides them with a supportive intellectual framework for their future development after graduation. (In passing, it might be noted that, as computers become increasingly common, it will be important for

Teaching programming skills remains a major component of computer courses.

There will be differences in the requirements for students in the humanities.

(continued on page 100)

Canada *(continued)*

universities to identify the level of knowledge and skills in computing students have when they enter the institution.)

While it is likely that there is a common core of information and applications of relevance to students from all disciplines, there will also be considerable differences in the requirements for students in the humanities as compared to, say, engineering or accounting. One appropriate skill for accounting students would presumably be the ability to use computer-based spreadsheets. The future architect or engineer will need an understanding of computer graphics and computer-aided design — although these topics are not widely taught in universities at present. The social sciences will continue to stress statistical calculation applications. Basic skills in the humanities could well involve the use of data bases and word processing.

These last two facilities are of particular interest since they have widespread applicability across disciplines. They are also among the most common applications in the world of business and industry, and the great majority of students will encounter them in their daily lives after entering the work force. It was mentioned above that, among Waterloo students, informal learning (i.e. outside the classroom) related to computing reveals a heavy involvement with word processing.

This leads directly to the question of "computer literacy" and broadens the issue of relevant computing skills to include attitudes to and understanding of information technology in a social context. The recent growth of courses about computing (in contrast to courses in computing skills) has already been mentioned. Such courses may well teach basic skills, but they also describe the logic and function of computers, discuss a wide range of applications, and — perhaps most important — examine economic, social, psychological, and political questions relating to the use of computers in contemporary society. Such approaches were often developed initially within faculties of arts or humanities with a view to providing some basic understanding and skills to students who, it was assumed, would have had little previous experience with such technology, and for whom the precise nature of appropriate job-related skills in computing was unclear.

It seems reasonable that an educated university graduate should know something of the historical development and underlying principles of the computer (including the functions of the various components of a sophisticated computing system); should be aware of the broader implications of information technology for present and future society; and should be capable of performing some tasks at a computer terminal, including (at least) simple programming.

Strategies for Teaching and Learning

Given that computing is an important part of the curriculum for all university students, what methods of teaching and learning are most appropriate to achieve understanding in a relatively short period of time? The most common teaching method in North American universities is the formal lecture, but this has serious shortcomings for teaching skills — either manual skills or cognitive skills, where it is essential for learners to have practice and to receive feedback on their performance. Hence it seems essential that students should have extensive opportunities to work on a computer, and to receive fairly frequent guidance from knowledgeable instructors — by knowledgeable here is meant knowledgeable about pedagogy as well as computing. This guidance can be provided by faculty.

It seems essential that students should have extensive opportunities to work on a computer.

Traditional lectures are not the best approach.

by tutors under faculty supervision, or conceivably be handled, at least in part, by instructional or assistance programs available on the computer itself.

Different institutions have tried various solutions to the problem of providing access to computers — ranging from the provision of student terminal rooms to the requirement that all students purchase their own microcomputer.

In the case of learning about information technology, especially its likely impact on cultural and social matters, the availability of terminals is less crucial. Here it would seem more important to challenge students to think through many of these issues for themselves, and this may present special difficulties for learners who are working outside their normal disciplinary boundaries. It seems unlikely that the traditional lecture, which encourages a passive role on the part of the student, is the best approach. One method that is planned at Waterloo will involve student groups in debates on various controversial issues relating to the use of computers in society. Students are asked to prepare a case pro or con on a particular issue (e.g. that the use of computers in the work place will create widespread unemployment), to carry out research on the issue and amass appropriate evidence, and then to present their case in a public debate before their peers. Alternative approaches might include the use of case studies and project work, with students attempting to solve problems that relate to the use of computers, and which require consideration of multiple sources of information — for example costs, hardware, possible social and psychological effects, etc.

A need exists to monitor teaching in the pre-university school systems — both to be aware of the incoming skills of students, and also to provide guidance to the schools on the way in which students in different disciplines might be best prepared for work at the university level. In universities that provide teacher training, the faculty of education can play a vital role in this respect. At Waterloo no such faculty exists, and the university has had to take its own initiatives in maintaining liason with the local school boards. Through its Computers in Education Committee, the university has had an input into the Waterloo School Board's recent policy statement on computing. The university co-sponsored a seminar on computing in the school curriculum that brought together educators from a variety of levels in October, 1983.

Small Use of CAI in Universities

One final area of computers and instruction is the use of computers to teach non-computing skills and materials — what we have referred to above as computer-assisted instruction (CAI). Despite considerable interest in CAI by many professional educators, the actual extent of its use in Canadian schools and universities is very small. Although there have been numerous experimental CAI programs and field trials, they have usually been short-lived, and instructional methods have reverted to the more usual lecture or tutorial after a short time. From the point of view of university teachers, the most crucial impediments would appear to be the rather crude (from a pedagogical view) and limited (from a subject matter point of view) nature of the CAI materials already available, coupled with the unreasonable demands on the time and patience of faculty who wish to prepare their own materials. While the potential of CAI appears great, many existing programs adopt simplistic teaching strategies (the so-called "electronic page turning") that attempt to emulate the human instructor or textbook, and fail to capitalize on the unique capabilities of the computer — for example in providing powerful simulations of situations

(continued on page 102)

Experimental CAI programs have been short-lived.

Decentralization of programs leads to incompatibilities between different types of hardware and software.

Canada *(continued)*

Teaching the entire student body technological literacy is a difficult task.

which would otherwise be extremely difficult or expensive to bring into the classroom. While it seems likely that, in the future, market pressures will result in the production of a much wider range of pretested commercial instructional software, in the short term it seems likely that traditional approaches to classroom teaching will continue to dominate.

An increasingly important concern for many large institutions is maintaining some type of control over the instructional computing that is taking place. The decentralization in teaching programs and related administrative arrangements leads to incompatibilities between different types of hardware and software, partial duplication of courses across departments and faculties, and so on. In attempts to provide an overview of computing activities at the institution, a few years ago Waterloo created the position of Computing Officer (a part-time faculty secondment) who is intended to keep a watching brief on computing activities and developments and to provide a direct source of advice to the senior administrative officers, bypassing the normal chain of command.

Teaching technological literacy in the broadest sense of the term is a difficult task, especially if our goal is to educate not merely technological specialists, but the entire student body in all disciplines. There is as yet no precise agreement on what are the essential components of such literacy, or how best to go about achieving it. Nonetheless, the challenge must be met if we are to graduate students who will play a full and informed role in societies that will be increasingly influenced by technology. **J**

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The Role of the Computer Centre In Informatics Education

by GLAUCO BERTOCCHI and MIRELLA SCHAERF
Centro di Calcolo Interfacolta Universita di Roma
Rome, Italy

The Italian high school is still awaiting a long promised but never formulated reform. The curricula are still those set 30 years ago, and informatics is an unfamiliar subject except in some experimental schools. Students come to their university courses without having any background whatever in informatics. What they know is what they get from the mass media and from advertising, and this is often more harmful than anything else. They do, however, feel the need to understand what informatics is, and to learn to use a computer.

The University of Rome is the largest university in Italy, with 120,000 students. Most of these students are workers or they are "fuori course"—that is, their course of studies has been completed but they have not yet taken all of their exams, or maybe they are still working on their theses. If only the students regularly attending their courses are considered, there is a total of approximately 50,000 students. It is obvious that if computer programming were to be introduced in the formal curricula of all the faculties, the number of attending students would drop to only one-third of the figure mentioned previously, being restricted only to first-year and second-year students. In any case, at the beginning there would always have to be a crucial year in which almost all the students would have to attend a programming course, provided it was easy to find the necessary means, i.e. terminals, classrooms, computing power, and so on. But where would all the teachers come from?

Two Possible Approaches

Our newborn Computer Science Department has been endowed with approximately 20 teachers who will need to face quite a few problems in running the future graduation course in computer sciences. The teachers of informatics-related subjects and mathematics are too busy dealing with theoretical problems to be involved in this sort of enterprise. In this situation there appear to be two possible approaches: (1) train teachers of other disciplines in informatics; or (2) provide the necessary means and structures to give training in informatics to the students of disciplines that come closer to informatics, such as engineering, electronics, mathematics, physics and statistics.

When the problem arose for the first time in 1978, the sole structure which could be looked to as a solution was the Computer Centre, which also represented a meeting point between informatics users and the experts in that sector. In time, this solution proved to be valid because the teachers, and as a consequence the computer science courses, are oriented to the need of training computer experts. Thus they do not appear to be particularly fit for training students interested only in applying data processing to their particular specialty or major. Furthermore, it is desirable that the courses be held in each discipline because computer usage must be related to individual subject areas.

(continued on page 106)

Teachers will need to face quite a few problems.

The teacher or researcher needs to have mastered both (computer) technique and application methodologies.

Italy *(continued)*

In order to teach the use of a certain instrument, the teacher or researcher needs to have mastered both the technique and the application methodologies, and be capable of transferring that knowledge to the students. As a consequence, action in this area must be aimed not only at students, but also at teachers and researchers in order to create necessary experience allowing use of the computer according to one's own needs. Such an experience would lead to a well-balanced adjustment of computers to research activities and to teaching. Efforts should therefore be aimed at identifying and working out modalities whereby the computer may become a common piece of equipment in environments differing greatly in scientific and cultural terms. Furthermore, courses must not be restricted to providing general information. Teaching methodologies and techniques should have the goal of promoting further independent development in learning and applications.

Separate Needs for Arts and Sciences

The fact of considering the computer as a working tool suggests that the various disciplines (and consequently people) be divided into two large categories: (a) environments equipped with instrumentation; and (b) all other environments. Technical and scientific disciplines such as physics, chemistry, engineering and medicine fall within the first group. Law, arts, humanities and political science belong to the second group.

It may prove useful to examine in detail one of the courses held for humanities teachers and scholars, with a look at the activities which followed it. The course was organized by the Computer Centre in cooperation with the School of Humanities. It consisted of 16 hours of lectures, eight workshop hours and two half-days devoted to the description of research projects underway in Italy in the humanities.

The 16 hours of lecture were divided as follows: introduction to computers and programming (four hours); elementary analysis of literary texts (four hours); data banks and information retrieval (four hours); and syntactic analysis, thesauri (four hours).

Short Courses Urgently Needed

All the topics were dealt with from the standpoint of methodology and with reference to the application software available at the Computer Centre. During the workshops the participants tested the various applications packages under the guide of an instructor. The teachers of the course were either analysts employed at our centre, or teachers of computational linguistics at either the University of Pisa or Oxford University, and they all contributed to the workshops or met informally with the participants.

At the end of the course the participants were invited to express their opinion on the course and on future activities. The most urgent demand was that of organizing short "crash" courses on the use of interactive terminals, on the usage of single packages, on the use of text editors and of the simpler control cards.

After five years of teaching activity we can summarize our experiences and draw some conclusions and indications for the future:

- The success of all of our activities was probably due to the fact that they were needed, rather than to their quality.
- The methodological approach proved to be more effective than the purely informative approach.
- The Computer Centre has proved to be the most appropriate place

Action. . . must be aimed not only at students, but also at teachers and researchers. . . to create necessary experience.

The Computer Centre has proved to be the most appropriate place for these initiatives.

for these initiatives, and its structure has allowed the seminars to have a more lasting effect through the creation of mixed working groups on special projects, or more simply on the assessment and choice of application packages.

— Teaching all students of soft sciences to use the computer will be an enormous task that cannot be coped with only by the Computer Centre.

— Computer Science teachers have proven to be willing to cooperate in holding courses and seminars, but in general they do not speak the "language" of the end user and they need some sort of "interpreter." They are, however, indispensable for their methodological contribution.

Continual Exposure to Disparate Problems

It appears to be rather evident that among the many tasks of the computer center of any university there is that of acting as a bridge between the Computer Science Department and all the others. Indeed, it is the Computer Centre which is, as a rule, provided with the technicians capable of designing and, if necessary, implementing the applications programs required by the various departments. Moreover, the staff of the computer center is used to being continually exposed to the most disparate problems and, generally, these technicians have acquired the capability of adjusting to the language and mentality of widely differing scientific environments.

Of course, our Computer Centre is not endowed with unlimited resources by trying to provide them with the bare minimum in terms of methodology and technique, thus integrating their courses with the implementation of basic packages; and (b) forwarding to the Computer Science Department all problems having the character of advanced research. In this manner, the following objectives would be achieved:

(1) Users are made capable of dealing with and solving their data processing problems, and this experience then becomes an integral part of the activities of the various departments.

(2) The Computer Centre is not oppressed by the need to meet the requirements of all of its non-expert users, but it can devote its resources to more advanced projects.

(3) The Computer Science Department is not flooded by the most disparate demands by various departments, but is involved only in significant research projects.

We are well aware of the fact that this approach will not eliminate the conflicts of authority between the two bodies and the need for some coordination, but we feel that this solution appears to be the only viable one within our university. **J**

Efforts are directed at making (computer) users autonomous.

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A Management Oriented Systems Design Method Used to Train Systems Engineers At Japan's Institute of Information Technology

by TOSHIO NISHIMURA

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Every business enterprise faces many problems which keep clamoring for proper attention and solution. And we can not think of a single business or corporation immune from such problems. So, we may well define a business enterprise as an area of human activities wherein all kinds of problems converge. It is therefore no wonder that enterprises are always looking for ways and means to solve the problems. Therefore, they try constantly to recruit and develop personnel capable of working out desired solutions.

Affected by the surrounding world and by society, both of which are becoming increasingly more complex, the problems companies face today are similarly becoming more complicated and difficult. This is the reason why the need for a systematic approach, and a method of problem solving are now keenly felt in all phases of business activities.

Systems for Problem Solutions

Twenty years have passed since Japanese industry began using computers. These years witnessed the fast accumulation of valuable experience by industry. In the process, the application of computers has grown intensively and extensively, even in the farthest corners of Japanese business activities.

It seems we have come to a junction where we should pause for a moment of reflection, asking anew of ourselves: "What is a computer for business?" The answers to this question may differ by individual companies but if corporations are understood to be areas where problems converge, computers are best recognized as a "tool" for problem solving, and can be best utilized as such. Nevertheless, we often find an elaborate computer system developed for data processing with no intent to go beyond that use. Even in such a case, where an information system is developed as an overlay to data processing, we find more often than not that those who designed the system are unaware that they have developed "a system for the solution of problems."

It is true that many systems were designed without intent to formulate "a system which would directly contribute to the solution of problems." Such practice is obviously wrong and should be regarded as a deviation from proper procedure. This type of impropriety has its roots in the education and training of systems design engineers. The education is either too computer oriented, or it has placed too much emphasis on detailed design art or techniques. As a result of such unbalanced formation, systems designers tend to pay more attention to the features and capabilities

Computers are best recognized as a 'tool' for problem solving.

of individual computers than to the suitability of the system being designed to achieve a particular purpose or goal. Sometimes the designer is only interested in developing an elaborate system to do more sophisticated data processing. From our standpoint, the solution of the problem is the heart of issue. The computer should always remain a "tool." So, while it is important to convey to the students and trainees complete knowledge about the computer and its operation, it is even more important to develop their abilities to discover systematic ways of solving problems.

Students should be so trained that they can first identify and define the real problems experienced in actual business activities. Then they should be capable of developing a new system to replace the existing one which has been the source of problems. We call such an approach "the systems design of actual business systems," which, we believe, is the prerequisite for meaningful and profitable usage of computers. It is a concept or methodology for fruitful systems designing with which the systems engineer should become thoroughly familiar during the period of professional formation.

Development of a New Method

In most business organizations, the people in charge of the computer belong to the data processing section or department (DP). What expectations does the DP manager have for members of his group, who are usually called "the systems engineers"? The minimum requirement is said to be knowledge and aptitude for EDP systems. This is the reason why the education of systems engineers has become heavily computer-oriented, placing major emphasis on the EDP system itself, and not paying much heed to the fact that EDP is only a means to an end. We have long doubted the validity of such concepts and resultant training programs. Discontented with traditional courses, we keenly felt the need to develop a new concept and method, streamlined and geared to the attainment of goals — an approach which is the "systematic solution of problems."

The new concept and methodology first had to be clarified in order to lay a solid foundation upon which to develop a new curriculum for systems engineer education. We proceeded precisely along this line. We first pinpointed major issues and activities, then developed a new concept, procedure and method of systems engineering, aided by our research associates. Whatever results we could obtain from research and discussion, we applied to actual business situations to test their validity and usefulness. The end results thus obtained were no longer as computer-oriented as in the past, but were designed to solve the problems that really exist in a particular system of business activities. We call the result an "actual business system." Our concept begins with the design of an "actual business system." It can then proceed to other design activity, such as the development of information systems and EDP systems.

Each of these design stages can be architecturally combined to form an integrated whole. Since many companies have grown ill at ease with traditional concepts and methods, a great many EDP managers rallied to support us when our new concept and methods were made known to them. They readily adopted our procedures in their operations and we now have several hundred cases of actual applications. Needless to say, many improvements and corrections were made during the test period, and we may safely say that the new concept and method have fully matured. The name given to it is "MASD," which stands for "Management-Oriented Systems Design Method."

We have long maintained that the qualifications of a systems engineer can be summarized and expressed in four key words: "attitude,"

(continued on page 110)

Sometimes the designer is only interested in developing an elaborate system to do more sophisticated data processing.

Our concept begins with the design of an 'actual business system.'

[Students] say their insight was considerably expanded.

The entire method is new simply because it is totally geared to the solution of problems.

Japan (continued)

"knowledge," "technology," and "experience." Attitude is of particular importance because every candidate for systems engineering must acquire an appropriate attitude, which consists of keen consciousness of the problem, a sharp grasp of purpose, and the tenacity to build up an integral whole. Without fostering such an attitude within himself or herself, it would be impossible for a systems engineer to meet the real requirements of business activities, no matter how well he or she is versed in knowledge and technology.

IIT (Institute of Information Technology) is a non-profit organization which was established following a study by the advisory committee of the Japanese Ministry of International Trade and Industry in 1970. The study emphasized the need to produce a great number of specialists such as systems engineers and senior programmers to cope with rapid development in the field of information processing in Japan.

In 1976, IIT inaugurated the MASD training course for systems engineers. We are now in the eighth year of operation, and have begun the 15th course of training. The aim of the course is to help the students acquire the professional sense, mind and capability needed for systems design engineering. Such a goal can be attained only when the trainees are properly led to grow in the four key areas of attitude, knowledge, technology and experience, which are best reached through case studies. The principles and methods underlying this course are the same as those developed in MASD. A significant feature is that the curriculum evolved strictly in accordance with the design procedures set forth in MASD.

Approximately 250 persons have already participated in this training, and almost all of them attest to its effectiveness and usefulness. They say their insight was considerably expanded, as verified by practical experience. Such good results can be attributed to the unique features of MASD being based on the deductive method of systems approach, and having systems design procedures derived from the design of actual business systems.

The enthusiastic reception of the new course by students is indicative of the shortcomings inherent in traditional systems design activities. They were too computer-oriented, thus restricting potential applications. In other words, we were led to learn that systems design activities should be goal-oriented instead of being means-oriented.

The Features of MASD

MASD is an approach which aims to solve a problem. It first selects a certain area of business activity where a particular problem arises. It solves the problem by replacing the existing system with a new system in which the causes of the problem are carefully eliminated. It is in this context that the new concept of actual business systems was introduced. This comprises all functions related to particular business activities. The entire method is new simply because it is totally geared to the solution of problems.

We maintain that a system is a scheme within the frame of which functions are performed. Therefore, the new method emphasizes that a thorough analysis of functions be made prior to any systems design work. The new system must be a scheme with a framework such that it will help the functions take place effectively and efficiently. The MASD analysis of functions prescribes the functional design procedures, resulting in a process called "horizontal development of analyzed functions."

What is considered most important in MASD is the design of the actual business system. Unless attention is directed to that base, the information system or EDP system created as the end result of our efforts would be neither practical nor useful. Taking this point into consideration, the

MASD design procedure stipulates four steps: (1) the tasks to be performed by the system are defined; (2) the actual business system is designed; (3) the information system is designed; and (4) the EDP system is designed.

Maximum Use of the Computer

Information systems and EDP systems are clearly understood as being two different systems in MASD, but such was not the case in the past. That misconception seems to have misled designers of EDP systems to disregard not only organization but also human beings involved in operating the systems. In actual business systems, information must be gathered and made available to actual functions. So, information systems must continually be designed and installed so long as the actual business system exists.

EDP systems are nothing more than the automated portion of information systems. This is the basic philosophy of MASD which must be clearly understood. In previous practice, EDP designers began by asking what and how much could be done by a certain type of computer. Our MASD approach is quite different. It first undertakes the review of existing actual systems and only then proposes improvement. It is after the actual systems improvement that design of information systems begin to meet the requirements of actual business systems. It is usually in this period that systems designers determine which portion of the information system should be automated, and to what extent.

Users Play a Leading Role

Many people are apt to regard systems engineering as something exclusively pertaining to computer operations. So the majority of people within a company believe that systems engineering is typically the responsibility of the specialists working for computer operations. Strongly affected by such a notion, those who work in the department where a new system is to be installed usually remain passive throughout the design period. Such an idea is entirely wrong. The objective is to solve the problems. Therefore, personnel within the department for whom the system is being designed should assume responsibilities and play a leading role in the system design activities.

The EDP department should support the end-use department with its professional knowledge, skill and experience, acting as a systems consultant. This is, in short, the philosophy underlying our MASD. In the actual systems design activities, members of the said two departments are combined to form a team to work together.

Systematic Development Needed

In summary, three things must be systematically developed and prepared for the systems design activity. They are well developed in MASD and what we have described in this article are merely explanations of their major features. The concepts and methodology came to the forefront a few years ago and were immediately put to the test in actual business applications, so they can no longer be called new. It is already the eighth year since IIT started a new training course along these lines. The method has since matured. As an educational program it has become a consistent series of case studies beginning with the discovery of problems and ending with the design of EDP systems. The MASD may also be called an IIT method since it was developed under IIT's patronage. It is more than just a tool for education and training. Widely applied in actual business, it has rapidly spread far and wide as a useful tool for systems design activities. It is hoped that as such MASD will continue to provide the sound foundation on which to build effective information processing systems. **J**

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The Design and Implementation of an Introductory Computer Literacy Course For Teachers and Educational Decision-Makers

by CHEN DAVID

and NACHMIAS RAFI

The Science Teaching Centre

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For many years, education remained a subculture within a technological society. The main processes with which education is engaged, namely information production and dissemination, remained, in principle, human-based processes, supported only by the 15th century print technology. The major technologies developed during the industrial revolution were concerned mainly with energy conversions, and exerted profound social changes. Yet those technologies bore no relevance to teaching and learning. The appearance of information technologies, mainly the availability of microcomputers, has brought about a technology which is finally relevant to the process of education. Therefore, for the first time the education system will face the real challenge of joining the 20th century technological culture.

Educators Not Prepared For the Computer Age

The implementation of computers in the Israeli education system during the last few years follows the uncontrolled model, fostered by commercial computer companies and other interest groups. In most cases, teachers and educators are not prepared for the computer age and its implementation. Some teachers resent the use of computers in education. They often claim that, "while using computers in the learning process we will lose essential human contact;" or "computers will replace teachers and dehumanize the education system." Other teachers are very enthusiastic about the potential use of computers in the classroom, and have high expectations regarding the new electronic innovation. At the same time, however, they lack a realistic view of the complexity of its implementation.

Rapid introduction of computers into the education system without any planning or preparation may, in the long run, disappoint these teachers and make them reject the technology. Therefore, we find teacher training one of the most important and essential aspects that must be dealt with.

Curriculum Has Two Versions

On the basis of forecasting the future use of computers in schools, the Science Teaching Centre at the School of Education at Tel Aviv University started at the beginning of the year 1981 to develop an introductory computer literacy curriculum for teachers and educators. The syllabus and the learning materials developed were first tried in an experimental, full-credit academic course during the academic year 1981-82.

Considering the achievements of the participants, their needs and interests as reflected from formal evaluation of the course, direct feedback

(continued on page 114)

Microcomputers (have) brought about a technology which is finally relevant to the process of education.

Some teachers resent the use of computers in education.

Israel *(continued)*

and observers' judgment, in addition to comparative analysis of similar courses given in other institutions, the curriculum was revised in two versions: one for teachers and the other for educational decision-makers.

Each of the two versions gave emphasis to different academic content and skills but shared the same goals and syllabus. In the academic year 1982-83 the revised versions were tried out as an academic course (40 students), and as an intensive extracurricular course for major decision-makers in the Israeli education system (50 participants).

Goals For Course Design

The following goals were set for the computer literacy course:

(1) Understanding that computers are part of the "information revolution" and not a passing fad.

(2) Understanding that information technology provides, for the first time in the modern history of education, an appropriate and relevant technology.

(3) Defining a realistic estimate of the capabilities and constraints suggested by applying computers to education.

(4) Presenting the diversity of the use of computers in education.

(5) Acquiring basic concepts and skills concerning the use of computers in education.

(6) Creating positive attitudes towards computers by developing a sense of control of a computer and demystification of the technology.

(7) Developing judgment skills for decision-making concerning hardware and software utilization.

Following is a brief description of the course syllabus.

PART 1: THE INFORMATION SOCIETY

— Origin and Nature of Information Technology (2 hours). An anthropological view of technology as part of mankind's cultural evolution, with special emphasis on information technology. The emergence of early systems of symbols followed by the invention of writing and number systems. The invention of printing technology. The development of computing machines, from mechanical to electronic computers. The merging of computer systems with communication networks to create a communication technology which can process alphanumeric, visual and acoustic information.

— The Social Implications of Information Technology (2 hours). The scientific revolution and the information explosion. Economical parameters of information changes and occupational profiles. The many uses of computers — home, work, commerce, entertainment, education, communication and social centralization and decentralization. The potential for participative democracy, ethical issues, the individual and society in the information age.

— Computer Technology (4 hours). The history of the electronic computer from the vacuum tube to the chip. Input — processing — output. The binary code and a representation of symbols in a computer (bit, byte, kilobyte, megabyte). The difference among mainframe, mini and microcomputers. The microcomputer components, CPU, I/O devices, memory (ROM, RAM, PROM), peripherals. The usage of microcomputers. Initial hands-on experience using computers.

— The Relevance of Information Technology to the Education System (2 hours). The major problems faced by the education system: its magnitude, the vast amount of information to be delivered and disseminated, and the inefficiency in catering to the diversity of the student population. Education operates as a non-technological organization; however, information tech-

The syllabus and learning materials developed were first tried in an experimental course.

Most of the course lectures were enriched by videotape films.

nology is, for the first time, offering a breakthrough in handling the major problems encountered. Each problem area is discussed.

— A General Overview of the Potential Use of Computers in Education (2 hours). The computer as subject matter. The computer as an instructional aid (CAI). The computer as a management tool (CMI). Using information as a problem solving aid.

PART 2. COMPUTER-AIDED LEARNING — CAL

— Computer-Assisted Instruction (CAI) (6-8 hours). Basic concept and structure. The place of CAI in the curriculum. Drill and practice and tutorial systems. Description and demonstration of CAI systems: "TOAM," "MASKOV," "SEMEL," "MACAL," and PLATO.

— Intelligent CAI (ICAI) (2-4 hours). Description and demonstration of ICAI systems. The advantage of simulation as a teaching aid. Motivating educational games.

— Software and Courseware Design and Evaluation (4-6 hours). The software and the curriculum issue. The theory of programmed learning and modern learning theory. Basic concepts of software design. Some criteria of courseware evaluation. Workshop acquaintance with and evaluation of educational software.

— Computer-Managed Instruction (CMI) (2 hours). CMI in a macro-system. CMI of the CAI — controlling the information flow in a classroom. Modeling the student — diagnostic programs. Information sources and information receivers in an educational system. Repetitive behavior that lends itself to automation. Levels of decision-making in education. Data generating and processing at school management level.

— Using Information Technology to Enrich the Learning Environment (2 hours). Technologies: data bases, electronic library, video disk, communication network, teletext, view data. The individual and the learning environment. Classroom school community and the new learning environment.

PART 3: COMPUTER LANGUAGES AND EDUCATION

— Man-Machine Communication (2 hours). Basic concepts of communicating computers. Operating systems. Computer languages — the assembly language and high level languages. Authoring languages. Compilers and interpreters.

— Basic BASIC (6-8 hours). Basic concepts of computer programming in BASIC. Workshop — how to write and run very simple programs (mainly graphics).

— LOGO (4-6 hours). Papert's education philosophy of LOGO. The structure of the LOGO computing language. Expectations and practice in the use of LOGO. A short workshop on LOGO.

PART 4: IMPLEMENTATION OF COMPUTERS IN SCHOOLS: A PRACTICAL VIEW

— Implementing Computers in Schools (2 hours). Introducing an innovative technological change. Hawthorn effect and resistance. Grassroot vs. central strategies of implementation. Hardware constraints, human constraints, economical constraints and the software constraint. Changing the school into a technological organization.

— Configuration of Computer Systems in Schools (2 hours). Introducing computers into the existing school structure: the logistics and maintenance, central laboratory and learning centers, interweaving into the existing curriculum. Individualizing instruction. Coordinating CAI and CMI. Stand-alone systems, hard disks and network configurations.

— Cost-effectiveness of Using Computers in Education (2 hours). The problem of estimating quantitative educational output. The changing cost

The hands-on experience workshop consisted of 12 hours of microcomputer interaction.

We see an increase in the interest of most participants.

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Israel *(continued)*

of hardware and software. Mainframes vs. personal computers, analysis of special needs.

— Computers: Special Technology for Special Children (2 hours). The gifted; the handicapped; the low achievers; those with impaired hearing; the blind; special interest groups.

— The Computer in Informal Education (2 hours). The computer as an information resource. Using networks in a community infrastructure. Computers for leisure. The electronic library and viewtext educational services. Computers and the creative arts. Individualized vocational training. Communication and cooperation across geographical barriers for educational purposes.

PART 5: SUMMARY AND DISCUSSION (4 hours).

Basis For Further Development

While we consider our observations and conclusions as still preliminary, at this stage they serve as a good basis for further development.

In an overall impression of the course, we see an increase in the interest of most participants, who are realizing the fact that we are now facing a technological innovation which is relevant and appropriate to the education system. Most of the students feel that the technology is not sufficient to ensure an educational breakthrough. Only careful design and controlled implementation will realize the potential of the technology.

The growth of interest and the transition from naive enthusiasm to a realistic appreciation and critical judgment of the process of implementing computers in education were evident both in students of education and education decision-makers. Many of our students have enrolled in advanced courses, and unexpectedly large numbers of them have sought further personal guidance for M.A. theses and special projects. Most of the final projects attacked essential problems critically and constructively.

A more accurate evaluation can be made with respect to the decision-makers. A revised policy, undertaken after the seminar, reflected a change from short-range concern in purchasing hardware and technical details to long-range planning of the implementation process, its experimental control and its careful dissemination. The second trend is the transition from a passive decision-making approach towards an active one. Only long-range observation and research will enable us to study the full effect of the course on the implementation process. We can only say that the revised syllabus and the recommended instructional methods will now be used on an extended scale, and by 1985 will become a compulsory course for all students at the School of Education. At the same time, an adapted version will be used for teachers' in-service training by the Department of Further Education.

We can only hope that this course will contribute to a rational, human introduction of the technology into the education system. **J**

Unexpectedly large numbers (of students) have sought further personal guidance for M.A. theses.

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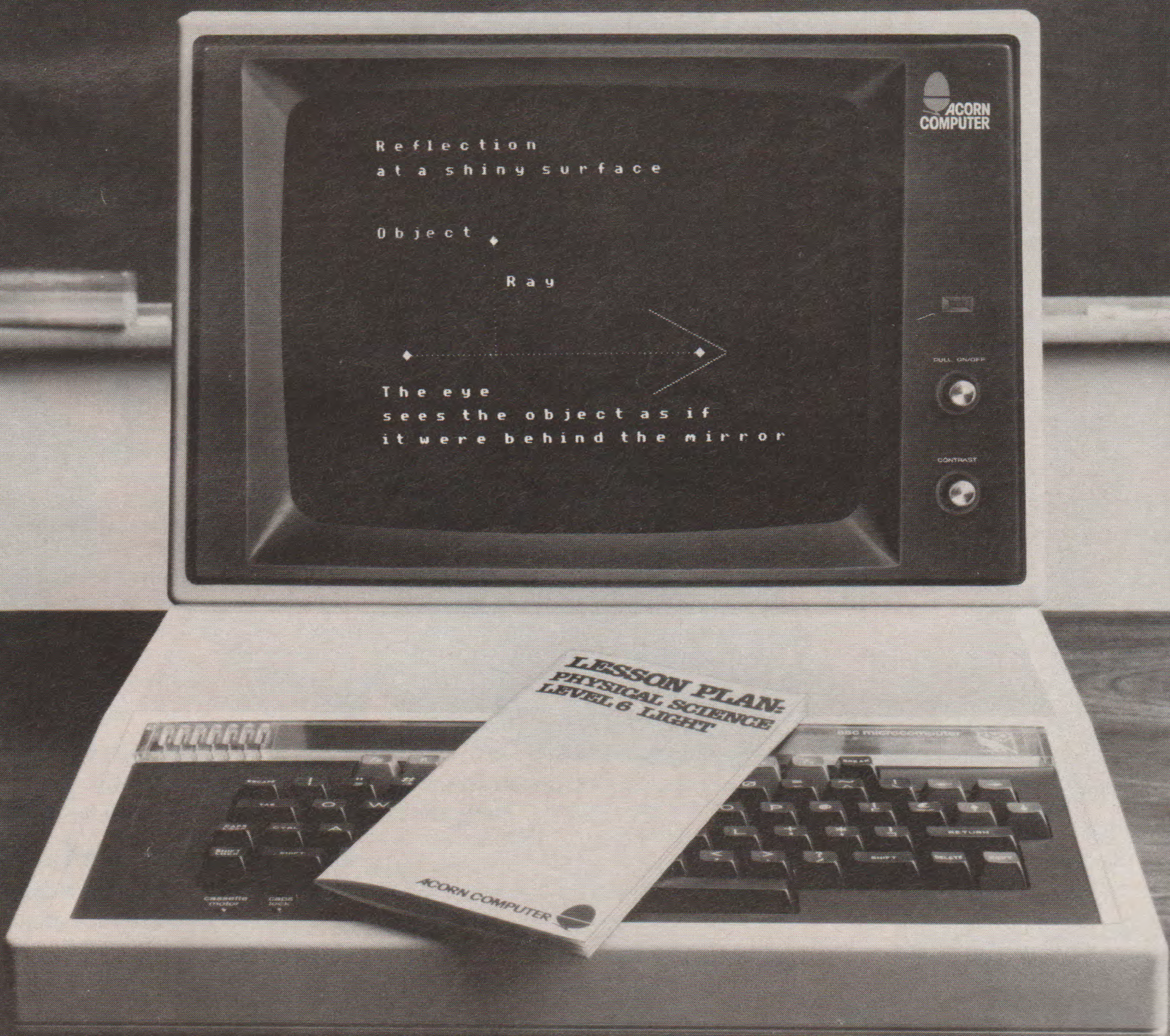
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1  GOTO 1000: REM *** COLOR EATER ***
2  :
100 NC = 0
101 FOR I = X - 1 TO X + 1
102 FOR J = Y - 1 TO Y + 1
104 IF I < 0 THEN I = 0
105 IF I > 39 THEN GO TO 120
106 IF J < 0 THEN J = 0
107 IF J > 39 THEN GO TO 120
109 CC = SCREEN ( I,J)
110 IF CC = C THEN X = I:Y = J:COLOR= C: PLOT
K,Y: GOTO 100
112 IF CC < > 0 THEN NC = 1
115 NEXT J,I
120 C = C + 1: IF C > 15 THEN C = 1
125 IF NC = 0 THEN GOTO 100

```


Teaching Business EDP

by P. MERTENS

Betriebswirtschaftliches Institut

Universitat Erlangen-Nornburg, Nurenberg, West Germany

Since the mid-fifties, computers have been used for business applications which are more than simple calculations (such as payroll). And since that time we may speak of data processing as reality. University education has followed this trend, sometimes being a little behind developments in industry, such as networking; sometimes being ahead of them, in systems integration or in decision support systems.

Three Different Ways

In West Germany — and as far as I can see, in many other countries too — there are three different ways of studying business EDP at the university level: (1) business EDP as part of a curriculum in business administration or management; (2) business EDP as part of a curriculum in computer science; and (3) business EDP as a separate curriculum.

The first possibility is the most widespread one, so we shall concentrate on this solution. The third possibility is controversial, because it leads to narrow specialization which might be a serious drawback for a manager.

Main Subjects of Business EDP	
Subject	Hours/Week in One Semester
Introduction to hardware	2
Programming in COBOL	2
Introduction to operating systems	1
Software engineering and software tools	1
Data organization and data bases	2
Systems planning and organization of the EDP department	2
EDP systems in manufacturing firms	2
EDP systems in banking and insurance	1
EDP systems in trade, traffic and public service	1
Management information systems	1
Exercises on the terminal (decision support systems, large computers)	1
Exercises on personal computers, Programming in BASIC	1
Seminar on current issues	2

The first chart contains the main subjects of the business EDP program in my own university (but does not include the introductory courses in the first semesters which give only a broad overview).

Course Problems Considered

With respect to the initiation of our EDP course, there were a number of points which had to be examined, including:

(continued on page 120)

Business EDP is taught as a part of the business administration curriculum.

Basic knowledge will be learned from a textbook, not in the lecture.

Germany *(continued)*

- (1) the range of the subjects to be taught is rather broad;
- (2) we needed very different teaching methods, or a complicated mix of methods;

(3) in West Germany, the numerical ratio between students and faculty is not good. In the first semesters there are approximately 600 students attending the lectures.

Emergency measures instituted for these introductory courses were finally settled upon, as follows:

(a) We take care that basic knowledge, e.g. introduction to the binary system, will be learned from a textbook, not in the lecture. Professors will not teach these subjects, but students must know them for the examinations.

(b) Approximately one-third of the education takes place in a large auditorium; it is a pure lecture, which can only be assisted by some films, in which some elements of hardware and software are demonstrated, using tricks.

(c) Two-thirds of the education takes place in groups of 60 students. There we discuss examples of small information systems and try to build flowcharts and to write small programs in BASIC.

It is hopeless to teach the growing multiplicity of programming languages.

Teaching Strategies in Special Areas

PROGRAMMING.

(1) On which level of abstraction should we teach? As it is hopeless to teach the growing multiplicity of programming languages, there are scientists who favor the policy of training our students in an abstract language, which contains as many elements of real languages as possible.

(2) Which language should be taught? In business data processing we have to choose between APL, BASIC, COBOL, PASCAL and PL/I. We have, moreover, to consider some more special languages, such as ASSEMBLER, LANCODE, ADA and SMALLTALK. We have two "schools of thought": some people make the point that we should teach as modern a language as possible, which contains many sophisticated ideas and which helps to learn a good style of programming. At this moment, they favor PASCAL and they persist in the opinion that BASIC would be something for those less sophisticated. I prefer to train the students in the most widespread languages, in our case COBOL and BASIC, not PL/I or ADA or PASCAL.

As regards the sequence in which the languages are taught, we have chosen one which seems strange. Our first course is in COBOL, an intensive course with a great deal of assistance by tutors. Then it is up to the student to acquire knowledge in BASIC for himself, using our personal computers. To assist him or her we have developed a "bridging course" titled "BASIC for COBOL programmers." For our COBOL course we have the following philosophy and organization: the student begins with a textbook in order to gain the basic knowledge of the syntax. Then there is a first examination and only the students who pass this examination are admitted to the course itself. Students who find out they don't like data processing and programming will resign at an early stage and so our limited training capacity is not overburdened by them.

(3) Which technical aids should be used? There are professors who think that students should learn conventional programming, while others claim that the students should learn to work in modern programming environments, e.g. with an interactive system using program generators, method libraries, data dictionaries and other tools. The best situation would be if the student had both possibilities, but in most universities

Our first course is in COBOL.

equipment restrictions don't allow that. We teach conventional programming and thereafter we introduce modern tools, but unfortunately, without a chance to train every student on the machine. We plan to buy equipment to project on-line programming dialogues, taken from a computer display, on a large screen in the classroom, but that doesn't mean practical training on the job.

HARDWARE.

The second chart gives some idea of the subjects of our introductory hardware courses.

Subjects of Hardware Courses
Switching elements - state of the art and future
Nonconventional hardware architecture
Storage technology
Terminals
Input devices and data acquisition equipment, e.g. special terminals for special industries, optical readers
Printer technology
Speech processing
Office equipment
Data transmission and computer networks, local area networks
Process control equipment

Our students will not construct and produce computers, but they must be able to select machines and their components. Typical questions, to be answered by our graduates in their jobs, might be:

- should the orders of the customers be acquired using: punched cards - computer displays in our firm - mobile terminals - videotext - exchange of floppy disks recorded by the computer of the customer - data transmission from the customer's computers?
- should mass data be stored on tape, on disks, or on optical media, such as microfilm?

The main problem in this area of education is, on the one hand, the selection of items out of the myriads available, and on the other hand, the rapid technical progress, together with the fast obsolescence and the short life cycle of the knowledge. Moreover, our students have only very limited basic knowledge in physics, electronics and electrical engineering. So it is difficult to explain various techniques of data transmission, and it is not possible at all to spend much time teaching basic knowledge in electrical engineering. We have to stress the overview and, above all, the price-performance ratio of several technical possibilities. The presentation films and video films, in which the technical principle, e.g. of a laser printer, is demonstrated by tricks, is very useful. In addition, I try to take as much equipment as possible into the classroom, e.g. mobile terminals, junctions of local networks or desk-top plotters.

APPLICATION.

Courses dealing with EDP applications in business and industry are often underestimated by scientists from other disciplines. Sometimes they presume that the applications are so similar that special lectures are not necessary. But applications in a manufacturing firm are quite different from those in banking, insurance companies, or hospitals. Therefore, we have some special courses in Nuremberg. The students can use knowledge acquired in other lectures of their management studies, such as accounting, production and marketing. Here, they have an advantage over students from other disciplines, such as computer science, with whom they are in competition in the labor market. One problem is that modern concepts are integrated concepts.

(continued on page 122)

We plan to buy projection equipment to show (classes) on-line programming dialogues.

Our students have limited basic knowledge in physics, electronics and electrical engineering.

Germany *(continued)*

In man-machine dialogues, human judgment replaces algorithms.

Such overspecialization is dangerous and we have to pay a lot of attention to the connections between several functions, such as marketing, production, purchasing and accounting. When batch processing was popular, EDP people tried to automate numerous functions using operations research algorithms. So we had then to demand good knowledge in operations research and mathematics. In recent years, concepts of this type have lost their importance because, in man-machine dialogues, human judgment replaces algorithms. But we cannot renounce algorithms completely. We need them, for example, for the forecasting of orders, calculation of lot sizes in purchasing and production, and portfolio selection in bank EDP.

Unfortunately, students of business administration are often not very talented in mathematics. From the point of view of didactic methods, it is advantageous to visit companies to see the environment of the application, as well as the EDP concept itself. For example, students are guided through the workshops of a manufacturing firm. We show them the raw materials, the semi-finished products, the finished products, and the assembly process, together with the handling of the computer-printed documents for materials management or production control in the shop. Thereafter, they are given a presentation on the computer-aided design of the products they have seen and on the computer-assisted system for order processing, which produces the documents for the shops.

Very important is the demonstration of software packages. But to be able to do this, the university must have a computer from a manufacturer who can offer the latest commercial software products.

Practical Courses Suggested

Of special importance for students of business EDP are practical exercises at the terminal. I recommend the following types:

- teaching the tools of software;
- interactive systems, simulating the job of certain managers in the firm, e.g. the people who prepare the budgets or calculate the products, or the bookkeepers;
- word processing; and
- business graphics.

In Nuremberg we have introduced some courses of this type, using the following organization:

(1) We stress preparation at home, so that the limited capacity of the terminals is not wasted by students who come without the necessary knowledge of the subject. Partly, we make use of self-teaching material, partly of computer-managed tests.

(2) If possible, the course includes a small case study, e.g. the decision whether a customer order should be accepted when production capacity is limited.

(3) The training subjects should be varied, but the teaching staff must not be forced continually to invent new examination tasks.

(4) The students should learn the business content of the course, such as budget preparation, production scheduling or marketing planning, and also the technical design of the interactive system, e.g. with reference to software ergonomics.

(5) The students should become familiar with as many computers as possible, including mainframes, minicomputers, and personal computers. **J**

We make use of self-teaching material and computer-managed tests.

Microcomputers and Informatics Education at the University Level

by TODOR BOYANOV

Microcomputer Laboratory,

University of Sofia Institute of Mathematics, Sofia, Bulgaria

At the University of Sofia there are many possibilities and methods of microcomputer use and application. The following classification of those potentials is based upon our experience in teaching:

(1) Students in the department of mathematics and mechanics need to develop software and related microprocessor systems.

(2) In the departments of physics, chemistry, biology, geology and geography, students must investigate and control the corresponding processes, objects and phenomena.

(3) Students in the humanities have a need to use data bases to perform statistical data processing.

(4) All future school teachers must be prepared for microcomputer use in secondary schools.

(5) University teachers and postgraduate students will be using microcomputers in their own teaching and research.

Teaching in the Department of Mathematics and Mechanics

In the department of mathematics and mechanics, all students study informatics at different levels of proficiency. Based upon that curriculum, it seems appropriate for informatics education concerning microcomputers to contain the following:

- hardware and architecture of microcomputers, microprocessor systems and families;
- sets of instructions, addressing, I/O devices, interruptions;
- operating systems, assemblers, editors, compilers, interpreters, high-level programming languages;
- particularities of microprocessor software;
- algorithmization, programming and control of processes and mechanisms;
- systems for experimental data acquisition and handling;
- digital data-transfer and computer networking;
- data base management; and
- artificial intelligence.

These subjects might be considered in the proper way in different courses, such as (1) programming for microcomputers — a basic course; (2) system software for microprocessors — a special course in system programming; and (3) applied software for microcomputers — a special course in mathematical modeling. All these courses must include project work consisting of the development of an appropriate software product.

The importance of courses in mathematical modeling such as numerical methods, operations research or discrete mathematics is well-known with respect to the advent of widespread use of computers. The personal microcomputer provides new possibilities for the pedagogic strategies of teaching mathematics in general, and the above-named courses in particular. In addition, teaching efficiency may increase with

(continued on page 124)

Students study informatics at different levels of proficiency.

The personal microcomputer provides new possibilities for... teaching mathematics.

Bulgaria *(continued)*

the use of graphics in computer systems developed for studying techniques such as unconditional and conditional function optimization, mathematical programming, equation solving, numerical integration, and conformal mapping.

Teaching in Experimental Sciences

Microcomputers may be utilized in the teaching of the experimental sciences — physics, chemistry, biology and geology — in at least two ways.

The first is the use of microcomputers in real time data processing and control. This application may be accomplished by a course titled "Microprocessors for Measurement and Control," which includes elements of microprocessor hardware and architecture, I/O devices and interruptions; real time operating systems, assemblers, high level programming languages and scientific program packages; algorithmizations, programming and control of processes and mechanisms; systems for measuring, experimental data acquisition and statistical handling; pattern recognition and machine graphics; A-D and D-A conversion and data-transfer; and mathematical modeling and numerical methods. This course must end with an appropriate project consisting of the development of a measuring/control microprocessor system.

Microcomputer-assisted learning is the second possible application in the experimental sciences.

Teaching in Humanities

It is obvious that informatics education in the humanities must depend upon both the style and ability levels at which it is aimed. Knowledge of hardware is not needed here, and applied software use only needs to be learned. So a course "Informatics in Humanities" might include data structures; data base use; statistical packages; applied linguistics and logic; and the social impacts of personal microcomputers.

Computer-Assisted Learning and Teacher Education

There is a large variety of possible applications of microcomputer-assisted learning for all students at the university level. Individual program realization depends on the specific character of the selected area, and even on the imagination of its designer. Herein, the main concept may be described as a "theory of modeling and simulation by computers, to be developed together with the corresponding pedagogic strategies of teaching." Such a theory must be included in the education of teachers to keep pace with the didactical and psychological aspects of microcomputer use at the secondary school level.

Informatics education for all students is both possible and necessary in view of the advent of the widespread use of microcomputers. However, teacher education requires new methodology and pedagogic strategies of teaching. **J**

Microcomputer-aided teaching, and microcomputer-assisted learning require differing methodologies.

Informatics education for all students is both possible and necessary.

Presenting Computer Literacy for the B.C. Generation at the Smithsonian Institution

by C. DIANNE MARTIN, Instructor
Computer Science Dept., George Washington University
and RACHELLE S. HELLER, Instructor
Computer Science Dept., University of Maryland

Computer literacy has become the key educational issue of the 1980s. There has been a great deal of attention focused on establishing computer curriculum at the elementary, secondary, and post-secondary levels in the nation's schools. There has also been a growing commitment to provide teacher training to enable this curriculum to be integrated into the classroom. However, little attention has been paid to the adult population not involved in education. Through no fault of their own, most people over the age of 25 are B.C. citizens — that is, they received their formal education Before Computers.

Whether these adults be owners of small businesses, members of the labor force, professionals, or retirees, they often feel frustrated and threatened by their lack of knowledge about the information age in which they live and work. They find themselves bombarded with ads and articles in the media about computers and information technology which they are ill-equipped to evaluate due to their lack of computer literacy.

Traditional Solutions Inappropriate

There are many traditional solutions to this problem which turned out to be inappropriate for most adult learners. For instance, community colleges and adult education centers offer semester-long computer courses. However, such courses tend to be too technical, too language specific, and too time-consuming to be useful as a general introduction for the B.C. adult. Such an adult may have job and family commitments which make regular attendance at a semester-long course difficult at best.

Computer stores are often cited as appropriate places where the general public can go to learn about computers. The problem with such stores is that the information available is product specific. Certain brands of hardware and software are marketed to the exclusion of others. Most stores are geared to market to prospective buyers, not to teach the person who simply wants information.

Outdated Books Cause Confusion

Personal reading is often a way for the adult to learn about new subjects. A walk through the typical local library will reveal a small selection of out-of-date books on computers and data processing comparable to reading a book about the Model T to study automobiles. A similar walk through the local bookstore can leave the B.C. adult confused and overwhelmed by the diversity and sheer number of trade books available on the subject. Few books are written with the general adult learner in mind.

Some adults are becoming computer literate through on-the-job-training (OJT) at work. The problem with most OJT is that it is very

(continued on page 126)

Adults often feel frustrated by their lack of knowledge about the information age.

C. Dianne Martin and Rachelle S. Heller are the coauthors of the textbook "Bits 'n Bytes About Computing: A Computer Literacy Primer," and the "Bits 'n Bytes Gazette" for children, published by Computer Science Press. They have been in the computer field for the past 17 years and both received their M.S. in Computer Science from the University of Maryland in 1972.

Heller is the coauthor of the United Features weekly syndicated column "All about Computers." Martin represented the United States at the IFIP Working Conference on Computers in Elementary Education in July, 1983.

Smithsonian *(continued)*

job-specific. The adult learner who seeks a general understanding about computers and their impact on society would again be frustrated with only a turnkey knowledge of how to use the computer at work. In addition, managers and administrators do not like to be put in the position of being trained by junior personnel who know more about computers than they do.

One-Day Seminars Helpful

One program which has proven to be highly successful in helping the B.C. adult become computer literate is a one-day seminar such as the one developed and presented by the authors at the Smithsonian Institution in Washington, D.C. The Smithsonian Institution sponsors the Resident Associates program committed to offering quality educational opportunities to its members and to the general public for a reasonable cost. In the winter of 1981, Dr. Paul Edelson, one of the program directors, approached four faculty members (Dr. Richard Austing, Dr. Ben Shneiderman, C. Dianne Martin, and Rachelle Heller) at the University of Maryland to assist in the development and presentation of a computer literacy course for the general public. He was unsure of the market for such a course but felt that the Smithsonian ought to provide such a learning experience for its members. The first course offering was scheduled for March in a room that would hold 75 people. The charge for the course was \$32 for members and \$37 for non-members. Within a week of the first announcement of the course, it was oversubscribed by a factor of two!

During the spring, summer, and fall of 1982, three day-long computer literacy seminars for the general adult audience were offered with great success. There were 150, 300 and 450 participants in the seminars offered in March, June and November respectively. The course was held in a large auditorium and was presented in a lecture-demonstration mode by the instructors. The equipment used was a slide projector, an overhead projector, and a microcomputer with video output through projection television system onto a large screen.

Intended as a First Step

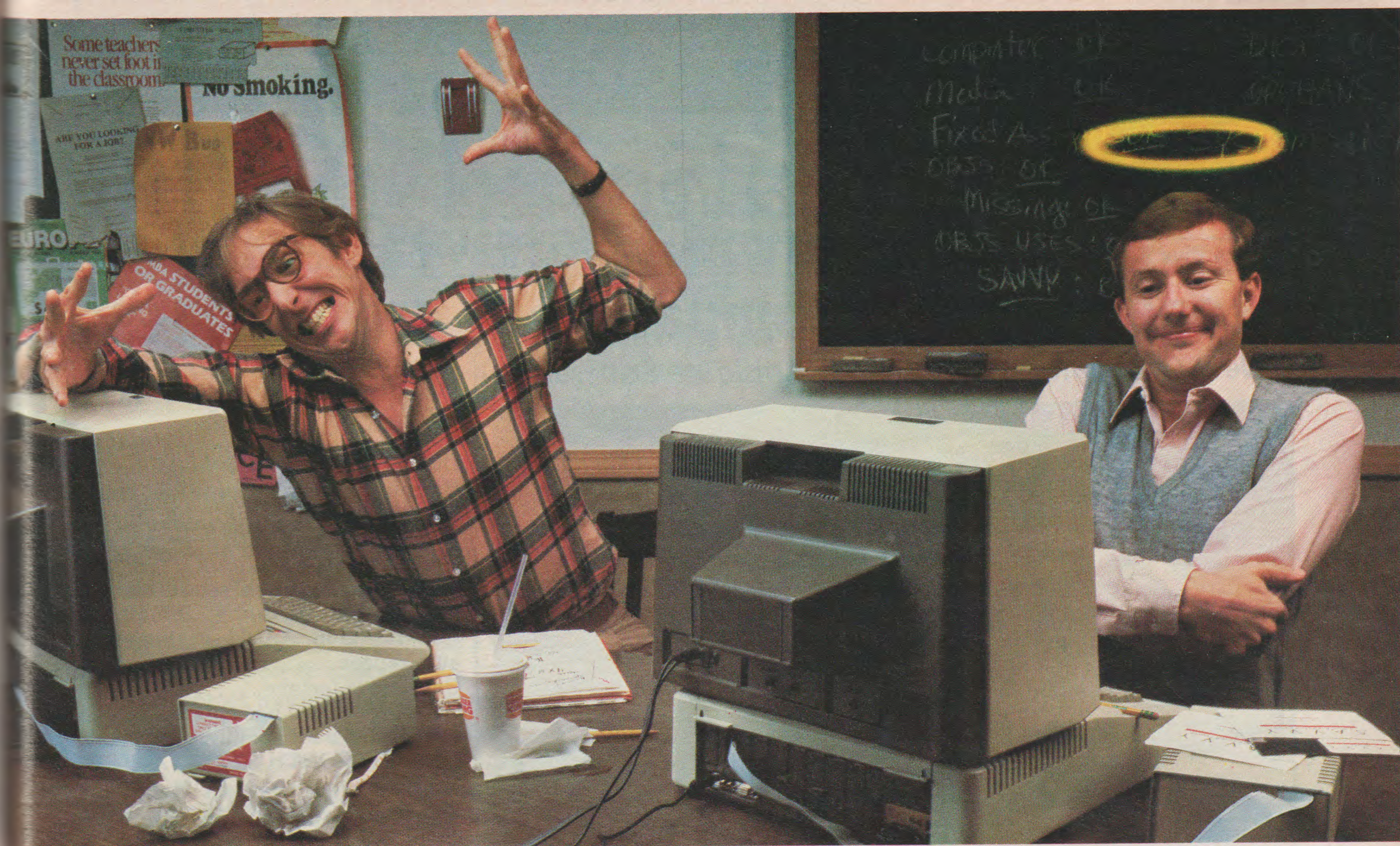
It is difficult to draw conclusions about the impact that such a one-day seminar will have on participants. It was intended as a first step — the demystifying of the computer — so that the participants would be encouraged to seek more information and training from some of the previously-named sources, if that was what they desired. The participants were overwhelmingly positive in their evaluation of the program. What most of them wanted when they left was to take the next step — to get some hands-on experience. They were now ready to sign up for a computer course or go to a computer store to look at personal computers.

Follow-Up Courses Planned

The Smithsonian will continue to offer this course as long as there is a demand for it. In addition, there are plans to equip a microcomputer lab to allow follow-up courses with a hands-on opportunity for those who want to go further. This one-day computer literacy model has also been used with great success for other audiences. It has been used as the first day of a week of computer training for officials in labor unions in the AFL-CIO. It has been tailored for educators, administrators, and owners of small businesses. In each case, it has been enthusiastically received as that first step toward demystifying the computer for the B.C. generation. **J**

Community college courses tend to be too technical.

The course will be offered as long as there is a demand for it.



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Functional Distance and the Attitudes of Educators Toward Computers

by Dr. CATHLEEN M. NORRIS, Dept. of Computer Sciences
and Dr. BARRY LUMSDEN, Dept. of Higher Education
North Texas State University, Denton, Texas

An examination of the literature having to do with the evolution of computers and their implementation indicates that cyberphobia — fear of computers — is now a common affliction affecting literally millions of Americans. Weinberg¹ attributes the fear of computers to individual feelings of lost control and predicts a worsening of the situation because the numbers of people experiencing cyberphobia will actually increase as society becomes increasingly computerized.

Taylor² quotes the president of a computer components company who believes "terminal phobia" is an attitude now widespread among corporate executives. Inman³ interviewed people who are regularly involved with computers but who still experience instances of cyberphobia.

Teachers are Fearful

According to Anderson⁴, most teachers are fearful when it comes to computers. Kelman⁵ and Calkins⁶ believe teachers and administrators range somewhere between apathetic and hostile in their attitudes towards computers. But what appears to be missing in much of the literature having to do with the attitudes of educators towards computers is empirically derived data that comment on the matter. This is not to imply that educator attitudes towards computers is an area of interest neglected by educational researchers. One has only to review the studies of Lichtman⁷, Stevens, and Wilson and Trenary⁸ to know that researchers are indeed interested in knowing what the attitudes are which educators have towards computers.

Researchers who have explored educator attitudes toward computers have treated attitudes as though they are undifferentiated in nature. In other words, one's attitude towards computers is treated as a constant whether the attitude being investigated is towards computers for classroom instruction or computers for the storage and retrieval of air travel information.

Nationality Research is Relative

Although his research has to do with nationalities of people, Samuel Bogardus⁹ was among the first to develop a technique for the specific purpose of measuring and comparing attitudes. His Social-Distance Scale consists of a number of statements selected to elicit responses indicative of the subject's degree of acceptance of any nationality group. The instructions for the scale begin: "According to my first feeling reactions, I would willingly admit members of each race (as a class and not the best I have known, nor the worst members) to one or more of the classifications under which I have placed a cross."

For each nationality to be measured, the response classifications available are (1) to close kinship by marriage; (2) to my club as personal

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Teachers and administrators range between apathetic and hostile in their attitudes toward computers.

9. Bogardus, E. S. Measuring Social Distance. *Journal of Applied Sociology*, 1925, 9, 299-308.

(continued on page 130)

Distance *(continued)*

Functional Distance and Educator Attitudes Toward Computers		
	Number	Percent
Computers are valuable tools that can be used to improve the quality of education	338	85.5
Teachers should know how to use computers in their classrooms	333	81.4
I would like to have a computer for use in my classroom	290	66.2

The difference of 4.1 percent between educators who believed computers are valuable tools that can be used to improve the quality of education (85.5 percent) and those who agreed that teachers should know how to use computers in their classrooms (81.4 percent) was statistically negligible and may be attributed to chance. However, the percentage difference of 15.2 between educators who agreed that teachers should know how to use computers in their classrooms (81.4 percent) and those who would like to have computers in their classrooms (66.2 percent) was significant. Also significant was the 19.3 percentage difference between educator responses to attitude statements number one and three.

Distance Changes Attitudes

When queried about their attitudes toward educational computing in general, educators appear to be highly positive. In the present study, fewer than fifteen percent of those educators surveyed disagreed with the statement that computers are valuable tools that can be used to improve the quality of education. Similarly, the majority of educators agreed that teachers should know how to use computers in the classroom. However, the "big break" comes when educators are asked to indicate whether they would like to have computers in their own classrooms. Distance appears to be operating at this functional level. Educator attitudes seem, therefore, to be positive towards computers as long as the function of the computers is removed from their experiential world of practice. When the suggestion is made that computers for their classroom use are desirable, the proportion of educators expressing agreement drops precipitously.

Educational administrators who want to implement computers in classrooms do well to remember that teacher attitudes toward educational computing must be taken into consideration prior to implementation. Teachers at the grassroots level are in a position to either facilitate or sabotage the best-laid plans of educational administrators. The procedure used in this study represents an adaptation of the Bogardus social-distance technique and appears to be a valid approach to assessing educator attitudes toward educational computing. **J**

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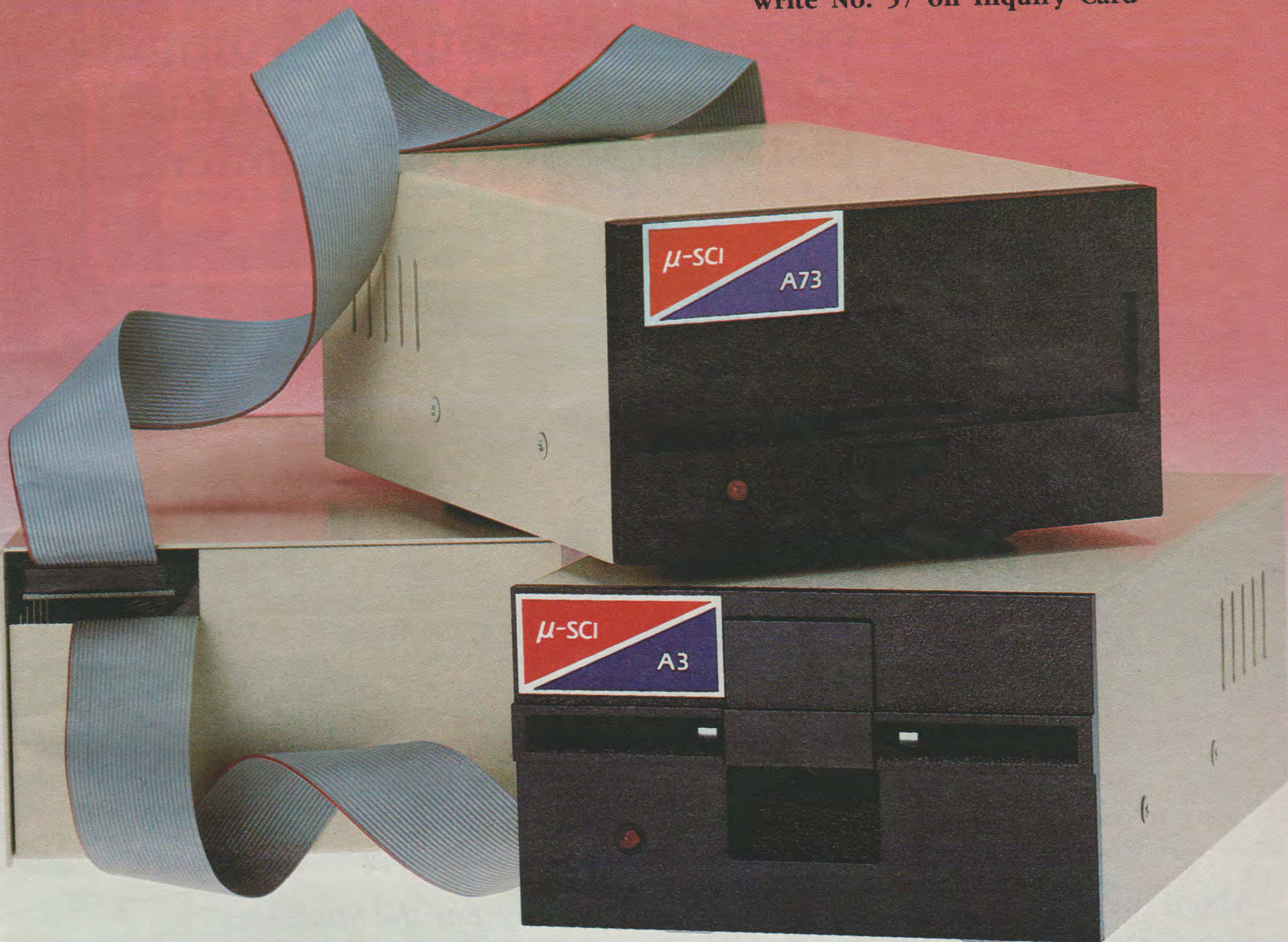
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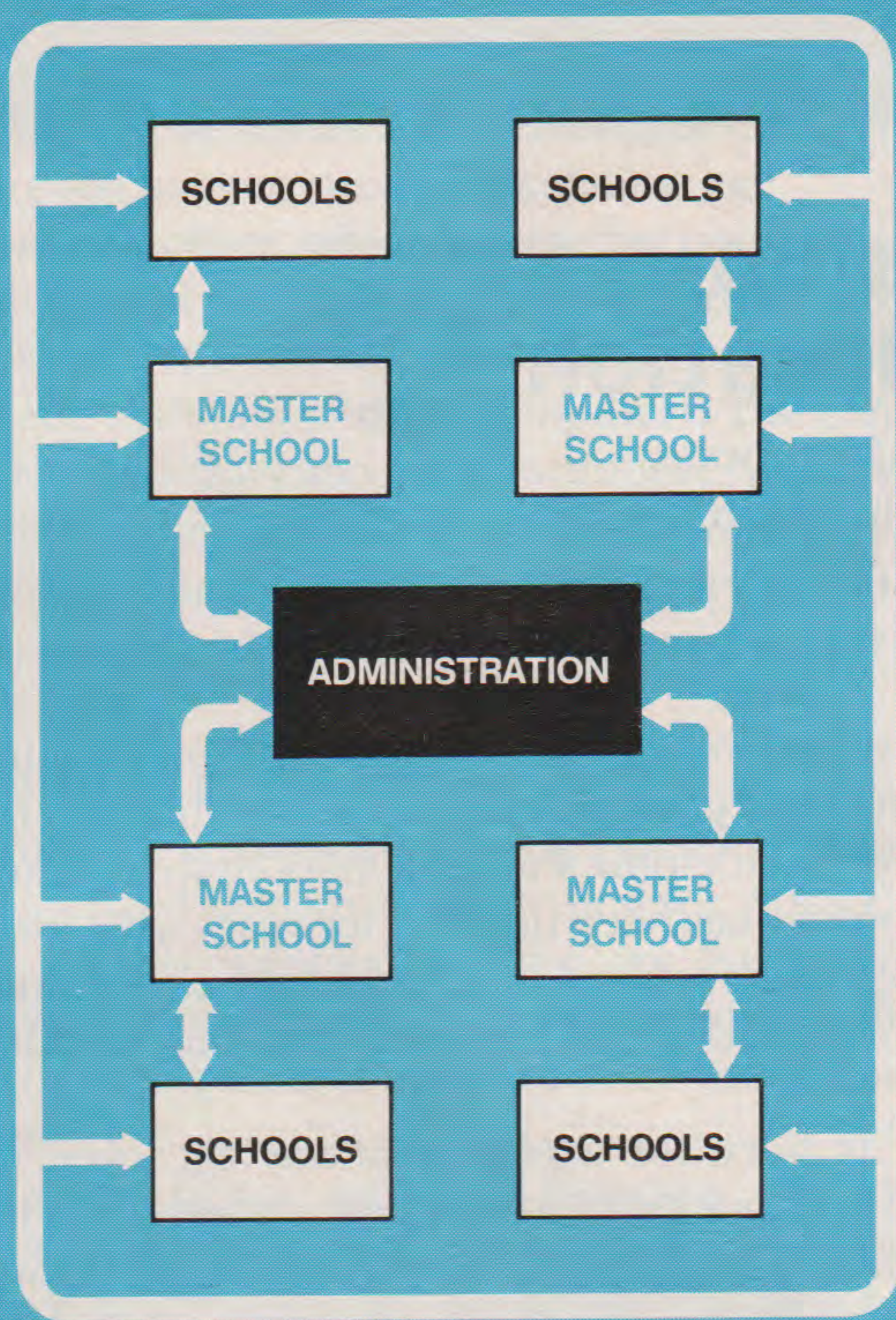
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Write No. 61 on Inquiry Card

Cable Television: An Aid to Education

by JOSEPH H. PREVITY, Member
Philadelphia Board of Education, Pa.

***Technology has become
an indispensable adjunct
to standard learning
techniques.***

Technology has touched the lives of everyone. In addition to being an indispensable tool of business and government, it is now a vital part of the educational process. In the Philadelphia Public School System, learning with the assistance of technology has been ongoing for years with amazing results. Technology has been used, refined and tailored for classroom use, thus becoming an indispensable adjunct to standard learning techniques in all subject areas.

For instance, the door is open for a person of any age over 18 to prepare for an examination and qualify for a high school diploma at his or her convenience. This learning process is taking place at home through a TV set via cable. Students are able to qualify for the General Education Development Diploma (GED) in the comfort of their living rooms.

A Plan For Home Courses

A major step, now being considered, is a plan for including courses for every school grade in the general education of children at home as well as in the classroom. Of course, television is not planned to rival or replace the teacher in the classroom. Programming and subject presentation will be critically monitored to attract and hold the attention of school-age children in the face of competition from commercial telecasting.

Cable television is coming to Philadelphia. It appears that we will have a system capable of the most sophisticated forms of communication imaginable. We seem to be on the verge of a technological revolution which will make an extraordinary change in the way we perceive our lives. The changes will be so incredibly monumental that an analogy to the impact of the printing press, electricity, the automobile or the telephone is appropriate.

Will cable television succeed as a means of improving the quality of instruction and educational offerings? I would venture to say that the outlook is extremely optimistic. The School District of Philadelphia has developed a blueprint for the use of cable television through the work of the Superintendent's Task Force on cable television. This far-reaching plan identifies many valuable uses of cable television, not only offering basic skills information to the schools but to the homes as well.

Cable TV Used to Raise Achievement

Curriculum and instruction is an important area in which cable will be used to raise achievement by offering a wide variety of instructional programs, available and repeated at convenient times, so that teachers and students will have access to well-produced material. Due to the flexibility the system allows, maximum support will be provided to the teacher in the classroom. Since instructional programming will also be available to the homes on the subscriber network, students who are absent due to illness will be able to tune in to the school district cable channel and supplement their instructional program.

Cable television will provide to the parents a phenomenal use of the opportunity to work together with their children at home on important,

***Teachers and students
will have access to well-
produced material.***

relevant and structured presentations. Our partnership with parents can move even further into the electronic age.

The computer, which is now becoming so inexpensive, is part of this technological revolution and has a distinct role to play in the use of cable television. One of the most promising uses of cable is its ability to interface with inexpensive computers. The computer applications will be truly revolutionary and our educational system will be significantly altered. The linking of computers through cable may present one of the most important milestones ever in the history of education. Through the use of cable, small and inexpensive microcomputers can open up worlds of information.

A World of Knowledge

Videotex is the name often applied to information that is accessed by a computer and shown on a television set. Attach a printer and copies can be made of this information. We are accustomed to seeing computers retrieving information but to imagine educational material such as lessons, exercises, curricula, in addition to information available to classrooms and to homes is to imagine a world of knowledge at one's fingertips. Millions of dollars are being spent on videotex development by large firms in expectation of the time when users will want this form of information delivery. In Philadelphia, our school children will have this information. It will be the future of education, and those who cannot or do not have access will be information poor.

For teachers, and even parents, obtaining specific material computerized to the grade and level of their children will become a commonplace activity. In spite of the tremendous safeguards of confidentiality and other critical issues which we as school board members must face, the ability to have each child's progress computerized in such a way that specifically tailored materials are available for learning is an incredible dream that may soon be a reality. A student will be able to practice drillwork, in a class or at home, tailored exclusively to his or her needs via cable and computer.

Education Will Depend on Cable TV

Just as modern business has become reliant on the computer, so will education depend on cable and computers for pupils' and teachers' attendance, and classroom and homework monitoring, as a means of administrative management. The vast statistical effort of the school district's research, planning and evaluation office can become even more effective due to the accessibility of this information at so many locations via cable. Standardized test scores and pupil achievement data will be immediately available.

It has been repeatedly proven that poverty is a major factor in lower achievement. We must not allow inner-city children to be "information poor." We must not allow other areas, perhaps more affluent, to offer more. The fact that Philadelphia is so late in being wired for cable may prove to be a distinct advantage in that the type of cable system which is being required for our city can be the most sophisticated in the world. Phenomenal technological advances can be incorporated in this city's system.

We are approaching one of the most important crossroads in education in Philadelphia, and I am convinced that if we do not take full advantage of this opportunity, the result will be an additional setback. I can envision vast resources being made easily accessible to all through the use of the latest technology. **J**

Videotex . . . will be the future of education.

We must not allow inner-city children to be "information poor."

CAD Training in Industry and Education

by THOMAS J. LAZEAR

President, T&W Systems, Inc., Huntington Beach, Calif.

We in America are facing an expenditure of approximately \$1 billion for CAD training.

A reasonable estimate of training costs appears to be \$10,000 per student.

EDITOR'S NOTE: At a recent seminar conducted by a West Coast professional-industrial association, an experienced business executive delivered a presentation describing the need for increased CAD training and a symbiotic relationship between education and industry which could increase the supply of trained operators of computer-aided design equipment. This article is a synopsis of his remarks.

Both industry and education are engaged in the training of large numbers of engineers, designers and draftsmen in the fundamentals and advanced concepts of computer-aided design (CAD). Each of the two faces problems which can partially be solved by the other: industry can benefit from an improvement in education's ability to efficiently train large numbers of CAD students; education can benefit through additional funding from industry — actions made possible by cost savings resulting from the employment of CAD-capable personnel.

To derive a mutual benefit from this situation, both education and industry need to be aware of each other's problems experienced as they strive to attain the same goal. For the purposes of illustration, I conducted an informal survey to examine the current efforts of both education and industry. Data was collected through interviews of executives at companies now using CAD, and of educators at universities and vocational schools where CAD is being taught. Those results were combined with my own experience and with literary research.

Several recent papers indicate a need to train more than 100,000 CAD-based designer/drafters during the next four years. One study revealed that it costs an average of \$10,000 to train a competent designer in CAD. As a result, we in America are facing an expenditure of approximately \$1 billion for CAD training.

Similarities Seen In Industry

Situations described by industrial executives indicated a degree of similarity much higher than expected. Combined, the results produced seven major points:

(1) To train an operator of a sophisticated CAD system to a level of 80 percent of "expert," it is necessary to expend approximately 120 student hours, 20 instructor hours and 60 computer terminal hours. A lower cost of training is experienced for operators of simpler and less expensive microcomputer-based CAD systems.

(2) CAD operator-trainees should be prepared by schools by instruction in basic mathematics and entry-level drafting.

(3) There is an additional need to also provide CAD training or orientation for personnel indirectly involved with CAD on site. Included should be top and middle management, project management, engineering staff, and other designers. In only one instance, however, had formal training programs been established for that purpose.

(4) If expensive CAD equipment is not properly operated it is underutilized. Any company not making the most productive use of its assets is experiencing unnecessary costs through revenue losses. It is agreed that the use of CAD can improve productivity. However, the employment of well-trained CAD operators can further enhance that benefit.

(5) In some instances, it was indicated that the best CAD operator also is a good designer. A CAD operator who merely understands the computer and its software has detailing customarily required of designers. These data indicate that CAD trainees should be drawn from among the ranks of current designers. At the very least, CAD operators should be required to learn design at the same time as they learn CAD.

(6) Two of my interview subjects said they found it necessary to retain the services of a trainer or consultant to conduct ongoing training programs, to provide a steady source of advice, and to keep the company up to date on advances in the field.

(7) A reasonable estimate of training costs appears to be \$10,000 per student, and includes both direct and indirect costs for instructor labor, student labor, supplies and CAD terminal expense as well as the "cost" of less-than productive output.

Commonalities Found In Education

Without a doubt, the dominant factor found at all educational sites surveyed was funding, or the lack of it.

On the part of community colleges and universities there is great awareness that computer graphics in general, and CAD in particular, must be made a part of the normal curricula. At many locations I found good plans for programs which would introduce CAD training. The difficulty is that educators don't know where to find the money necessary to obtain and install the computer systems needed for such training.

The Universities of Arizona and Oklahoma secured their funds from the normal institutional allotment for lab funds — steps which have worked well enough to get them started with a low-cost system. Through the National Science Foundation the federal government is funding the consortium. In California, Cal Poly is looking at a number of potential funding sources.

While not interviewed directly, Saddleback Community College in Southern California has an arrangement with the Fluor Corporation whereby theirs is the "school of record," but the company performs all of the training as well as supplying all of the needed equipment. Indeed, this is an example of a cooperative program which nicely solves the funding issue in an innovative manner. The only disadvantage is that Saddleback can accept none but Fluor students in the program.

Most universities surveyed recognized the need to have more than one type of CAD system available for their students, if those trainees are to get a broad perspective of CAD and therefore are to become aware of the trade-offs which must be accepted with the various approaches. At the University of Arizona, two different CAD software programs are utilized on low-cost computer hardware, plus an older time-sharing batch system on a main-frame. Cal Poly is considering a similar three-tier approach so as to offer students a wider perspective.

Industry Problems and How Education Can Help

The basic problem facing industry in the 1980s is productivity. One of the means to improve productivity is to introduce more automation. Specifically, that means more automation in the design office. There are, however, problems which are generated as a result of that action. Management needs to have an awareness of CAD. Established designers resist the implementation of CAD. The installation of CAD systems is expensive, especially for smaller facilities such as those of architects. The cost of personnel training must be considered. And industry must be cognizant of the short supply of available — and trained — personnel.

Due to the tremendous amount of press coverage on the subject, the

(continued on page 140)

Most universities surveyed recognized the need to have more than one type of CAD system available for their students.

Perhaps education's most important contribution is the introduction of CAD to high school classes.

Training *(continued)*

Education must become aggressive in providing (CAD) operator training.

awareness problem seems to be getting solved. Educators are helping by writing articles and participating in seminars. Perhaps education's most important contribution is the introduction of CAD to high school classes as well as to college drafting and engineering courses. Teaching CAD is important. The younger engineering, architectural and other graduates will carry their CAD messages with them into industry, and will serve as the catalysts — if not the implementors — of CAD utilization.

Resistance to changes such as CAD cannot be avoided entirely, for understandable reasons. Yet education can help even in this area, by teaching courses in "managing change" to engineering students. While the resistance won't be eliminated, the engineers introducing CAD will be better equipped to cope with that problem.

Most architects work in studios of ten or less people. Many engineers and freelance designers are in similar shops. These companies can't afford to purchase a \$300,000 CAD system that requires special environmental controls and a full-time computer operator — even if such an installation could double or triple productivity. High interest rates and tight money compound the problem. Education has dual opportunities to help industry in this matter. If the large CAD systems must be used, schools at least could assume the responsibility of training operators. And education could conduct research into low-cost CAD methodology.

The \$10,000 cost — or price tag — of training an operator on a contemporary CAD system is a large expense for any organization, especially when it is realized that part of those costs are repeated as new versions of CAD software are installed, and as normal personnel turnover occurs. This problem, of course, is the one that education is most able and most eager to solve.

As education works to reduce that cost-of-training, it should also improve the supply of available personnel for employment as CAD designers. If educators, with their efficient methods, train large numbers of students, better quality CAD operators will emerge. By the end of the 1982-83 school year, the University of Arizona at Tucson had trained more than 1,000 college freshmen in CAD. Soon, the best of that group will be finding their way into industry.

To install and staff the large number of CAD workstations being forecast as being necessary in America's future, education must become aggressive in providing operator training. But in order to rise to that challenge, education needs help from industry.

Education's Problems and How Industry Can Help

If education is to react to the challenge posed by the U.S. productivity crisis, several problems will first need to be solved:

- there needs to be an increased awareness of the situation among educators;
- both industry and education need to resolve matters of funding for programs to improve our nation's position;
- collectively, we must develop both resources and course materials;
- and there should be immediate activity in the training of CAD instructors.

As a beginning, the problem is being clearly stated within professional magazines and in seminars around the country. For a second step, industry can help by meeting with local educators to discuss the former's need for improved productivity, and to explain how executives see education playing its role.

Funding is clearly education's biggest problem. Coincidentally, that's where industry can help the most. If industry will make an investment in

The shortage of instructors trained in CAD is a problem which will work itself out with time. The question is, do we have time to wait?

education's CAD training programs, it will receive a high rate of return when the \$10,000 cost of training a CAD operator is taken into account. And when education makes employment recommendations to CAD graduates, industry will accrue additional benefits.

The shortage of instructors trained in CAD is a problem which will work itself out with time. The question is, do we have time to wait? To solve this problem, industry can help in several ways. Already-employed CAD operators and trainers having the necessary experience can be given time off to teach a class at local schools. At the very least, these people could be given some incentive to teach night classes. Conversely, industry can provide summer employment for potential teachers of CAD, allow them to attend an in-house training program, and to work as a CAD operator.

Since CAD is a new subject for many schools, there naturally is a shortage of course material. Again, this problem will be worked out in time. But to expedite the solution to this problem, industry can donate course materials such as texts, exercises and examinations. Education can certainly benefit from such contributions. And industry may also benefit through improvements made in course materials as the result of professional reviews given by educators.

The U.S. competitive position in the world demands that industry aggressively pursue improved methods such as CAD. Education badly needs industry's help, especially in funding the required resources — a necessary move if educators are to pick up their part of the load.

What Really Can Be Done?

Where are the 100,000 CAD operators who need to be trained in the next four years? Some are practicing designers and draftsmen who will need to get their training on the job or through adult education. Some are students in two-year community colleges, who will get their training either at those colleges or from their new employers. And the rest are juniors and seniors in high schools or vocational schools.

The best and least expensive place to teach CAD is in high school, vocational school or junior college. For the most part, the drafting instructors in these schools are enlightened. Their problem is funding. And these sites are precisely where industry and technical societies — through voluntary funding — can help and at the same time save themselves long-term training costs.

If the \$1 billion estimate of CAD training costs is even close to being true, what is our course of action?

Should students receive poor CAD training, we will never realize the productivity gains essential to America's future; the money spent on CAD won't produce offsetting benefits and we will be worse off than not having done anything at all; and we will lose even more ground to foreign competition.

On the other hand, high-quality CAD training will enable those students to contribute to America's progress. To make that happen we will need to spend \$1 billion and use contemporary training methods. Perhaps if we do a better job of planning, we may be able to save a portion of that cost and get a more effective result.

CAD training is an important industry. Let's hope we get our money's worth. A great deal is riding on it. **J**

Where are the 100,000 CAD operators who need to be trained in the next four years?

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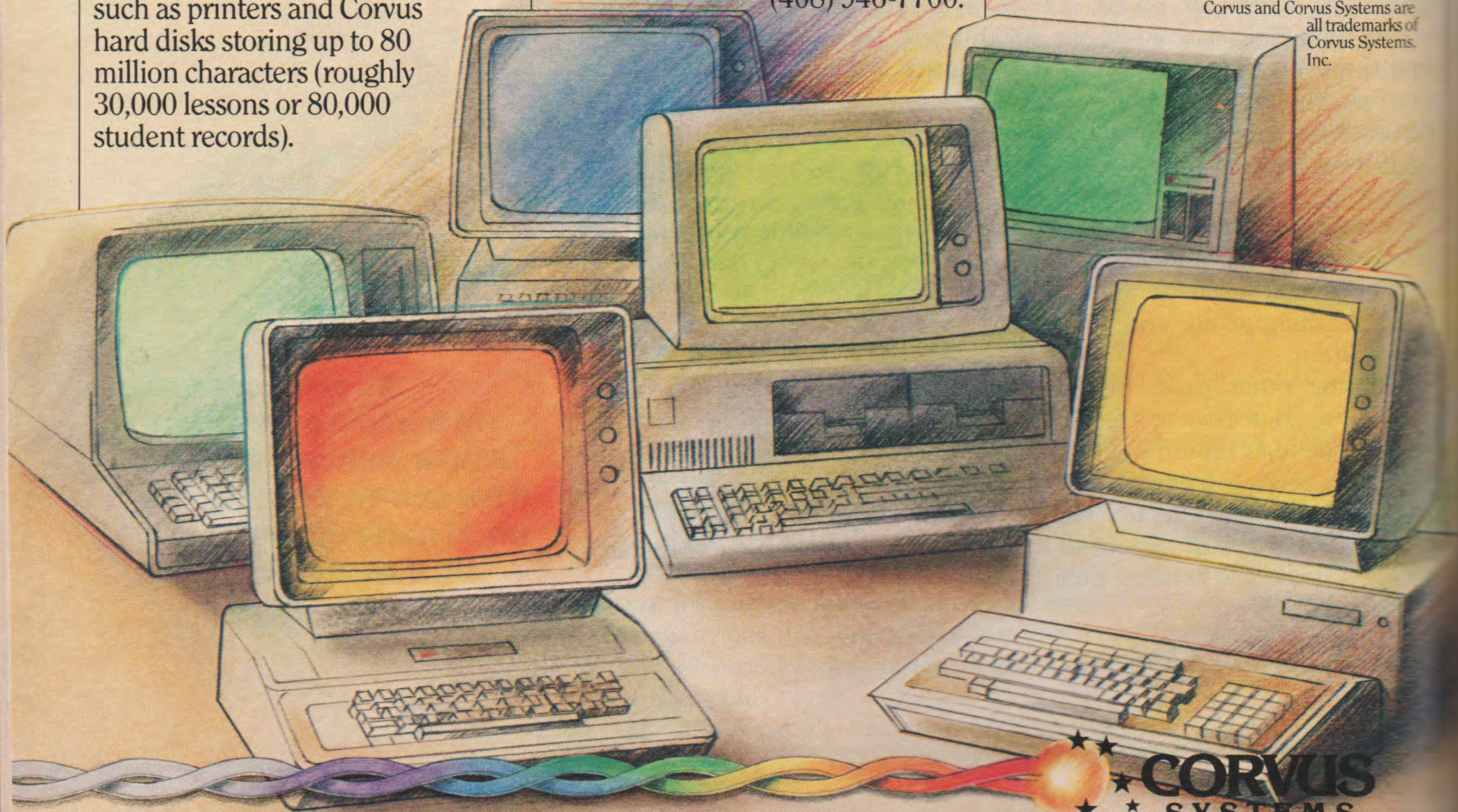
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Write No. 59 on Inquiry Card

Tying it all together.

**CORVUS
SYSTEMS**

A Futurist Looks At Edtech, or Wheel-Reinventing Reconsidered

by PAULINE MASTERTON, Ph.D.
Associate for Program Policy Analysis,
Florida Department of Education

Imagine there are some aborigines who live in a valley so remote from 20th century civilization that the tribe is still following stone-age ways, and is still well-adapted to its environment. What would such people do if presented with that marvel of modern technology — the wheel? Would they immediately add axles and build carts and create other forms of wheeled transport? Would they quickly invent pulleys and gears and move from there to the mechanized world of the industrial revolution? What would give them some compelling reason for changing from their traditional ways? Why would they start thinking about what new inventions are needed?

The tool-makers would have to look beyond pounding, scraping and grinding; the hunters and warriors beyond weapons and missiles; the priests and medicine men beyond their rituals and healings; those in charge of food, shelter, and rearing the young would have to consider what the community needs beyond those functions. Unless the ideas for the wheel are reinvented, and many new uses are imagined, this most versatile of artifacts could very well end up as a rather inefficient tool for pounding, and the community would indefinitely delay a realization of the wheel's tremendous potential for revolutionizing transportation and for sparking all the other wonders of the industrial age.

Some Options And Priorities

Our situation today has some interesting parallels and contrasts with the situation facing those stone-age aborigines. In every major walk of life, we are faced with technology options that could revolutionize our everyday activities. Those of us in education have a particularly dazzling array of possibilities, with microprocessors and media and combinations of hardware and software, with new research findings about learning and with startling forecasts about megatrends and social transformations — an information overload that is truly overwhelming. In some ways, we face a choice similar to the stone-age tribe with the wheel. We have new tools whose potential uses have only barely begun to be tapped — whose potential really depends on the imagination and ingenuity of the user. We can use technology to invent what we have never been able to do. We can use technology for the educational needs of yesterday and today. We can anticipate the world of tomorrow, and use technology to realize our dreams of the future.

No doubt each of us has a certain vision about the priorities for educational change — what we would like to accomplish if we had a whole NASA team and an unlimited budget at our disposal for equipment, training, research and development. As a futurist, my priorities are fairly modest. The technology for each of these priorities is available today, the equipment is being used, and there are, for each priority, training, research and development going on in Florida, and no doubt in other places as well.

(continued on page 144)

In every major walk of life, we are faced with technology options that could revolutionize our everyday activities.

Dr. Pauline M. Masterton received a B. Ed. from Chicago Teachers' College, majoring in art education. Her graduate work was in curriculum design (M.A., University of Chicago) and in instructional systems (Ph.D., Florida State University). Her professional experience in education has included elementary classroom teaching, television teaching, research associate work at the university level, and a variety of assignments with the State Education Agency in Florida. She was awarded an Education Policy Fellowship by the Institute for Educational Leadership at the George Washington University, and is a past president of the Tallahassee chapter of the World Future Society.

The teacher learns what she teaches, but she also lets the students teach her.

(Professors) set up a class using small groups of students working with a computer simulation game.

1. Bouton, C. and Garth, R.Y. The Learning Group: What It is and Why It May Be Better. *AAHE Bulletin*, Sept. 1982, 7-9.
2. Jerstadt, G. C. Computer-Enhanced Collaborative Learning: A New Technology for Education. *T.H.E. Journal*, 1983, 10, (7), 96-101.
3. Johnson, D. W. Group Process: Influences of Student-Student Interaction on School Outcomes. In *The Social Psychology of School Learning*, ed. by J.H. McMillan. New York: Academic Press, 1980, 123-168.

Edtech (continued)

What may be unique is my terminology for these priorities. The first is to transpose teaching and learning. The second is to rezone research. And the third is to elasticize experience. There are key technology phrases associated with these priorities and a number of projects and activities. The phrases include computer-enhanced collaborative learning, electronic messaging or teleconferencing, and simulation or interactive gaming.

Four Scenarios Can Be Visualized

Let me use a favorite trick — the scenario — to explain what I mean by each of these terms and to bring them to life in a fictionalized version of some real events and projects.

SCENARIO 1 - THE CLASSROOM.

A fourth grade teacher keeps reading about how computers are the tool of the future. She knows her students spend hours playing computer games, and she sees that these games offer compelling incentives for learning, provide immediate response, and are highly interactive. To find out more about computers, she subscribes to a computer magazine and takes a course at the local university. Since there is only one personal computer available at her school, she digs into her savings and buys one for herself. She still doesn't really feel confident that she is expert enough to answer every question the youngsters might have — in fact, she is fairly sure that there are quite a few students in her school, and even in her class, who know more than she does about computers. So she decides to learn along with those youngsters who are really interested. She and her school officials work out a plan for an extra-curricular class that meets early in the morning, before school starts. The attendance at this class is voluntary and the size of the class is limited. Students must get to school on their own, with the help and approval of their parents, and must stay on top of their regular school work.

Guess what happens? The teacher cannot really stay ahead of the youngsters, because some of them already have considerable computer knowledge, and they learn the material very rapidly. Of course, the best way to learn is to teach. So the teacher learns what she teaches, but she also lets the students teach her. And they learn what they teach, as well as what they discover on their own, plus what the teacher helps them with. There is more learning going on, more exploring and more solid development than she and the students ever thought was possible. What was happening was that teaching and learning was being transposed — the distinction between teacher and learner was fading away.

SCENARIO 2 — THE CAMPUS.

In the meantime, at the local university, certain professors and their students are also exploring in new territory. These professors do research on cooperative learning. They are convinced that learning in groups increases academic achievement significantly¹. Their studies support the findings which conclude that productivity and quality of group tasks, and performances of individuals in groups, are at the highest level when four to six people work together on a clearly-defined task where the focus is on peer relationships².

They also read the research about how computer systems can be designed to permit both individual and consensus responses, so that discussion can increase the quality of learning³. They are aware of how certain video and computer graphics games seem to come very close to creating a realistic situation in which people can experience various events, make decisions that affect the situation, and thus can learn from experience without actually going through the real-life episodes. They

have also observed that the video game format is ideal for developing the sustained concentration so important in all forms of learning.

To pursue their interests in cooperative learning, and to find out more about computer simulation gaming and computer-enhanced collaborative learning, they decide to do some research. They set up a class using small groups of students working with a computer simulation game called "Survival," which puts people into the experience of living for several months in an inner-city neighborhood with no job and only a small amount of money. The professors get the students involved in the design of the research experiment. The professors also each join one of the learning groups, so they are learners as well as teachers, and have the benefit of the group experience as well as the game experience.

The computer makes it possible for everybody's responses to be recorded; both oral and written opinions and reactions are transcribed for further study.

These professors are rezoning research — their own experiences as learners are part of what is studied. They are also transposing teaching and learning, not only by changing roles themselves but by using a game in which the learners are in a sense "teaching" the medium (the computer) to modify the instruction based on collective experience of learners. They are also helping to elasticize experience. The simulation game strategy shortens the time, distance and effort necessary to experience several months in an inner-city neighborhood. The game also stretches out the experience by giving each person a chance to share what other people are going through during each episode, and to capture the important moments for expansion and review.

Another set of events then occurs. The professors in this college want to share their findings with other people — in school districts or in universities — who might be involved in similar projects, or who might want to cooperate in further research.

SCENARIO 3 — THE CONFERENCE.

So the professors organize a conference. Their planning team expands to include some school district researchers and some state education agency staff. It takes several months to plan the conference, and the conference itself lasts almost a whole year. The out-of-pocket expenses for the year-long conference are minimal: a few dollars a day, on the average. Other participants in the conference spend from \$25 to \$400, depending upon how many times they participate. Nearly 500 different people come together during this year-long conference, including people as far away as Hawaii and Germany. Of course, this is no ordinary conference. It takes place in a hundred different locations, and uses a half-dozen different kinds of hardware technologies, from computers to TV, plus a dozen "soft" technologies — systematic processes that must be developed and learned in order to make the most of the hardware.

The conference makes use of electronic messaging, through computers and phone lines, and also audiotapes, videotapes and a variety of other audiovisual media. The original call for participation is made through the state's electronic bulletin board, an expanded version of a newsletter called the Monday Report which reaches all of the state's public education sector every week.

Next, the call goes out on the statewide Information Resources Network — called FIRNET — a linkage of educational institutions and agencies through a regional data center. One part of this system is called ARTNET, which links all of the arts and humanities faculties in the public universities of the state.

Also, since some of the professors are interested in applying their

(continued on page 146)

(The conference) takes place in a hundred different locations, and uses a half-dozen different kinds of hardware technologies.

Most of the conferring is teleconferencing — by computer and long distance telephone lines.

Edtech *(continued)*

rezoned research to working with gifted youngsters, and to teachers of all kinds of exceptional students, they send a message out on SPECIALNET. This computer message service is nationwide, as well as statewide, and links school district, state and federal agency staff, university people, and others who are concerned with exceptional students. In this year-long conference, there are several regional get-togethers, where people meet face-to-face. But most of the conferring is teleconferencing — by computer and long distance telephone lines. There are all kinds of subgroups carrying out small group conferences all the time. Sometimes there are real-time sessions in which some experts from out of state talk with experts in-state via phone-bridging, with call-ins and computer message questions and comments from hundreds of participants all over the state, and also out of state.

SCENARIO 4 — THE CONSEQUENCES.

The idea of computer-enhanced collaborative learning and transposing of teaching and learning become very hot topics. School teachers in different parts of the state are able to plan collaborative projects with university professors, and keep in touch about the details of the research. A lot of co-authored research papers get started and even completed that same year, and several professors co-author and edit books with school district researchers — giving a number of careers a significant boost. One book is set entirely on an author's own personal computer, and thus can speed into print first with the University Press and then with a publisher willing to market the book because of its timeliness, its early success, and the low cost of reproducing it.

Another result of all this activity is that a computer company is so impressed with the energy and performance of the people in this state, that a large donation of personal computers is made to several universities, and to several school districts. There is extra funding for testing software and researching certain learning effects. A number of professors also join the ranks of consultants to several companies and foundations.

The undergraduate preservice teachers involved with the professors who are part of the teleconference reap a great amount of benefit — but not more than the professors themselves. Everybody experiences big gains from transposing teaching and learning, from rezoning research, and elasticizing experience, from using computer-enhanced collaborative learning, electronic messaging and teleconferencing, and also simulation and interactive gaming.

These Scenarios Are Happening in Florida

Everything in this scenario is possible and also is happening — in some form — in Florida. We have SPECIALNET, FIRNET, ARTNET, and the electronic bulletin board⁴. We have people who regularly confer by phone-bridge, and by computer. We have teachers and youngsters and researchers involved in collaborative technology-related projects they want to share. And we have educational technology that can help us with accomplishments that were really not feasible before we had these new tools. All of this supports the view that it really is a good idea to keep reinventing the concept of the wheel, or the basis of any powerful technology. Imagination can help us go beyond using educational technology just to pound information into people's heads, or just to transport them from one grade level or course to the next. Imagination and ingenuity can help us reinvent not only our technology but the future itself. **J**

Another result of all this activity is that . . . a large donation of personal computers is made to several universities.

4. Daniel, K. F., and Masterton, P. M. Computer Messaging Systems for Florida Public Education. *Unpublished paper*. Tallahassee, FL: Florida Department of Education, 1982.

Teaching computer literacy takes more than a textbook!



Offering your students an essential understanding of computers involves more than merely following a good textbook. Because even the most basic systems aren't really self-explanatory.

Don't despair. Now you can turn to UES/MICROLIT for the effective integration of microcomputers into any school curriculum.

The UES/MICROLIT program was developed by an educator to enable the non-technical teacher to understand and teach computer literacy. In the classroom, it teaches the student to control the computer. The computer does not control the student.

We start with up to six days of hands-on training for your teachers. But our help doesn't stop there! A toll-free, 800 number and the UES support staff are always available.

The UES/MICROLIT program provides your school with complete courseware including concise instructional guides, a library of 140 overhead transparency masters, student workbooks, educational software, and timely program updates and enhancements.

And, as far as hardware is concerned, we can offer you substantial discounts on many popular micros including lease/purchase plans. The UES/MICROLIT program is operational on most IBM, TI, Commodore, TRS-80 and Apple computers.

For more information and a catalog, call Lorie Steinke at 1-800-843-9970 or just mail in the attached coupon.

Write No. 55 on Inquiry Card

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MICROCOMPUTER COURSEWARE WITH EDUCATIONAL SOFTWARE



YES, tell me more about how the UES/MICROLIT Program will satisfy my computer literacy requirements.

☐ Send free catalog with all the details.

☐ Have someone contact me immediately.

☐ We have _____ of _____
(NUMBER) (BRAND NAME)
microcomputers already installed in our school.

☐ We are interested in _____ of _____ microcomputers.
(NUMBER) (BRAND NAME)
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DATA SYSTEMS GROUP

3600 So. Minnesota Avenue, Sioux Falls, South Dakota 57105

Software & Courseware

Software Designed for Test Writing

Create-A-Test, a test writing program, has been introduced by Cross Educational Software. With the software teachers can select questions from question disks and print them out to produce formatted tests in as little as ten minutes.

Create-A-Test prints almost any kind of question, including true/false, multiple choice, fill in the blank, matching, and problem solving. Answers can be printed with the questions.

Teachers can buy questions or write their own with the built-in



CREATE-A-TEST

text editor. The Create-A-Test question library presently has 21 disks; each contains 450 questions. Topics available include: chemistry, biology, physical science, physics, botany, and geography.

Create-A-Test consists of two program disks, a sample question disk and a blank disk packaged in a padded binder.

The 37-page manual includes

step-by-step instructions that make it easy for anyone to use all of the features of Create-A-Test. The program requires an Apple II+ or IIe, one disk drive and a printer. *Cross Educational Software, Ruston, LA.*

Write No. 209 on Inquiry Card

Videocassettes for Apple II, IIe

Four one-hour videocassette tapes have been released by Computer Tutor Publishing Co. for the Apple II and IIe.

According to the makers, the tapes serve as the equivalent of a permanent instructor. Each tape is divided into 15-minute segments and uses an interactive format so that the user can achieve hands-on computer experience without prior preparation or experience.

The tapes were originally developed for instructional use in schools, but have found acceptance in the business and home use market, according to the makers. The tapes are titled: "First Byte of the Apple;" "BASIC Programming: Coding, Counting and Comparing;" "Graphics: A Picture is Worth a 1,000 Words;" and "Problem Solving: Calculating, Formatting & Filing." *Computer Tutor Publishing Co., St. Louis, MO.*

Write No. 212 on Inquiry Card

Software Features Nutrition, Diet

Nutrition and food additive quizzes, a diet analysis, and a food additive data base are now all available on diskette for personal computers. The software, Nutri-Bytes, was developed by the Center for Science in the Public Interest, a consumer advocacy organization.

The programs are entirely menu-driven. No special computer or scientific knowledge is needed to operate them. They are intended to provide a broad understanding of the healthfulness of the American food supply and some of the cor-

porate and governmental forces that help shape America's diet and food policies, according to the makers.



NUTRI-BYTES

The "Chef Pennypincher" diet analysis asks the user about the types of foods he or she eats and provides a diet score, as well as advice based on the answers. Quizzes on food additives and nutrition also provide scores to rate the user's knowledge. *The Center for Science in the Public Interest, Washington, D.C.*

Write No. 211 on Inquiry Card

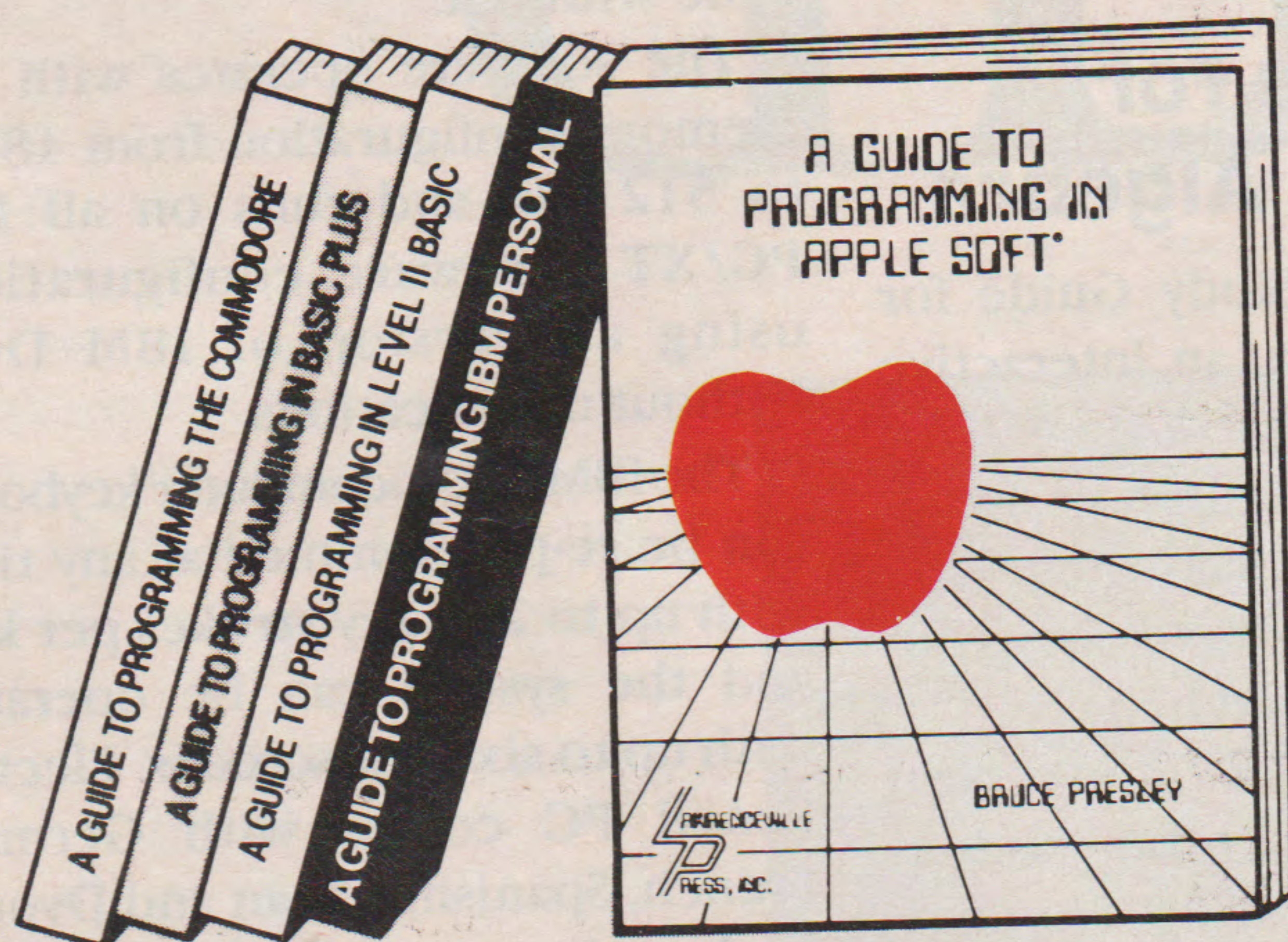
Four Programs for the IBM PC

IBM recently introduced four programs designed to expand the versatility of its personal computer product family.

The introductions include: IBM Personal Computer Word Proof, a text spell-checking program which includes a 125,000-word dictionary and a thesaurus; IBM Personal Computer Mailing List Manager, which allows a user to enter, store, retrieve and print names and addresses on labels; IBM Personal Computer VisiCalc 1.2, an updated version of the VisiCalc 1.1 electronic worksheet that can address increased memory and can reside on and support a fixed disk, and Exploring the IBM Personal Computer, an

(continued on page 150)

DO YOUR STUDENTS HAVE A MACHINE-SPECIFIC TEXT FOR THE COMPUTER IN YOUR CLASSROOM?



The challenge of teaching high school or college students to program needn't be made more difficult by having to work from a general text. Lawrenceville Press is proud to offer its series of introductory BASIC texts, written by a teacher specifically for the computer in your classroom.

The author, Bruce Presley, has been teaching programming for more than fifteen years. His knowledge of computers and, most importantly, his experience in how to *teach* programming, are clearly reflected in his books.

In his review for "Popular Computing" of *A Guide to Programming in Applesoft*, Robert B. McCown says: "I heartily recommend (this book) . . . Presley teaches Applesoft by posing thoughtful, realistic problems . . . Moreover, the author knows his audience; high-school students and adult beginners will find neither abstruse computer cul-de-sacs nor a tone that talks down to them." Teachers in more than 1500 high schools and colleges who now teach from Lawrenceville Press books seem to agree with him!

some of the features of special interest are:

- **STRUCTURING.** Students are taught from the very beginning to structure their programs for ease in reading and correcting.
- **FILES.** Special attention is given to this subject in a separate chapter.
- **GRAPHICS.** This chapter not only makes learning to program more enjoyable, but helps reinforce skills.
- **EXERCISES.** Numerous exercises are given at the end of each chapter, ranging in difficulty from high school to college level. Answers to odd-numbered problems are at the back of the text, and an answer key for the even numbers will be available to teachers.
- **REVIEW PROBLEMS.** Students are tested on each new concept as it is introduced. The answers are given at the back of the text.
- **FORMAT.** Each computer command is printed in red at the beginning of the section in which it is introduced. The command is given a clear definition, shown in a single program line, and then demonstrated in a computer program.
- **LAYOUT.** Topics are discussed individually, which allows the teacher to select only those units which are appropriate to the class.
- **DISCOUNT.** A discount is available to schools, colleges and bookstores.

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TO RECEIVE YOUR COMPLIMENTARY COPY OF ONE OF THE FOLLOWING:
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POWERTEXT. The Word Processing System For Professionals.



All across the nation, PowerText has become the prime word processing system for professionals.

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If you require a true high-performance system, consider PowerText.

Formatting is fully automatic.

PowerText prints the most complex documents—from business letters to dramatic scripts to legal documents packed with footnotes—precisely consistent with the formats you define. You need never worry about printed style as you write. Yet you always get perfectly formatted documents.

It's almost like dictating to your computer.

When you prepare outlines, questionnaires, and reports, PowerText can automatically indent and assign numbers to your paragraphs (Roman or Arabic numerals, or alphanumerics, as you direct.)

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You get built-in form letter capability.

Remarkably versatile columnar capabilities.

User-definable function keys.

And far more.

Yet for all its power and sophistication, PowerText is remarkably easy to learn and operate. The system includes an excellent 10-lesson tutorial and a reference manual.

We'll send you complete details.

It is impossible to describe all of PowerText's many valuable features here. But we'll be pleased to send you detailed information, including many samples of actual PowerText output.

Just write us a note, or phone us.

(Or you may wish to send for the tutorial and manual. The cost is \$25. Please indicate which computer you have.)

FOR IBM PC: \$399

FOR APPLE II OR IIe: \$299

**FOR IBM PC, APPLE II OR III,
WITH PASCAL: \$199**



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Write No. 16 on Inquiry Card

Software (continued)

introductory tutorial diskette that is being included with all IBM personal computer system units. *IBM, Entry Systems Division, Delray Beach, FL. Write No. 203 on Inquiry Card*

Study Guide for Precalculus Algebra

The Electronic Study Guide for Precalculus Algebra, an interactive software package, is designed for students who need support in algebra beyond the classroom. The software allows them to focus on areas where they need help.

Using an Apple II, a video screen and one disk drive, the student receives special tutoring. No computer experience is necessary.

The study guide is based on Roy Dobyns' "Student Study Guide," which accompanies "Fundamentals of College Algebra" by Earl Swokowski. Special features of the package include: single-key response; diagnostic support when a wrong answer is given, and step-by-step operating instructions. The program is written in BASIC and requires an Apple II or II+ with 48 Kb of memory or the Apple IIe and one disk drive, DOS 3.3. *Wadsworth Electronic Publishing Co., Boston, MA.*

Write No. 226 on Inquiry Card

Word Processor for IBM Microcomputers

Electric Pencil, said to be the first word processing system for a microcomputer — which was created by pioneer computer programmer Michael Shroyer in 1976 — has been completely rewritten in native 8088 machine language for IBM microcomputers. Named "Electric Pencil PC," the word processor has many new commands and features to take advantage of hardware features on the IBM PC and IBM XT.

Electric Pencil PC has been written specifically for the IBM PC

to take advantage of sound, color, the special word processing keys on the IBM PC keyboard and built-in hardware features. Based upon extensive testing, the makers claim it is virtually impossible to crash the new word processor, or to lose a file within it.

The software operates with any memory configuration from 48 Kb to 512 Kb, and runs on all IBM PC/XT hardware configurations using all version of IBM DOS, without modifications.

The IBM microcomputer keyboard can be re-programmed at any time with up to 255 key strokes per key, and the system can be operated with up to six split screens. Electric Pencil PC comes with German, French, Spanish, Italian and Dvorak keyboards pre-programmed. *IJG, Inc., Upland, CA.*

Write No. 228 on Inquiry Card

Software Authoring Packages For Apples

Courseware, Inc., has released the first of a series of software authoring packages for personal computers which allow teachers and business educators to create interactive, self-paced, computer-based lessons without the need for programming skills.

Designated the Apple Authoring System, this first offering in Courseware's Master Designer Series is for the Apple II+ and IIe personal computers.

Courseware's instructional techniques are built into the authoring system. Each lesson is designed to allow students to proceed interactively at their own pace with the ability to move back and forth between sections at the touch of a key. On-line helps are included to prompt the user through the design of a lesson or course.

The system includes four major components: training, screen builder, graphics builder, and lesson builder.

The system requires an Apple II+ or IIe personal computer with

(continued on page 152)

Available now.
Special Classroom Version.

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dBASE II[®] is, quite simply, the best-selling data-base management system (DBMS) made for any computer, ever.

And because it is so powerful yet so easy to use, it has become the standard for managing data with a microcomputer.

**Over 150,000 users.
So far.**

Doctors and lawyers, accountants and salespeople, stockbrokers and students, big businesses and small are all managing their data better with dBASE II. All over the country, around the world, users have found that dBASE II is the best solution to all their information needs.

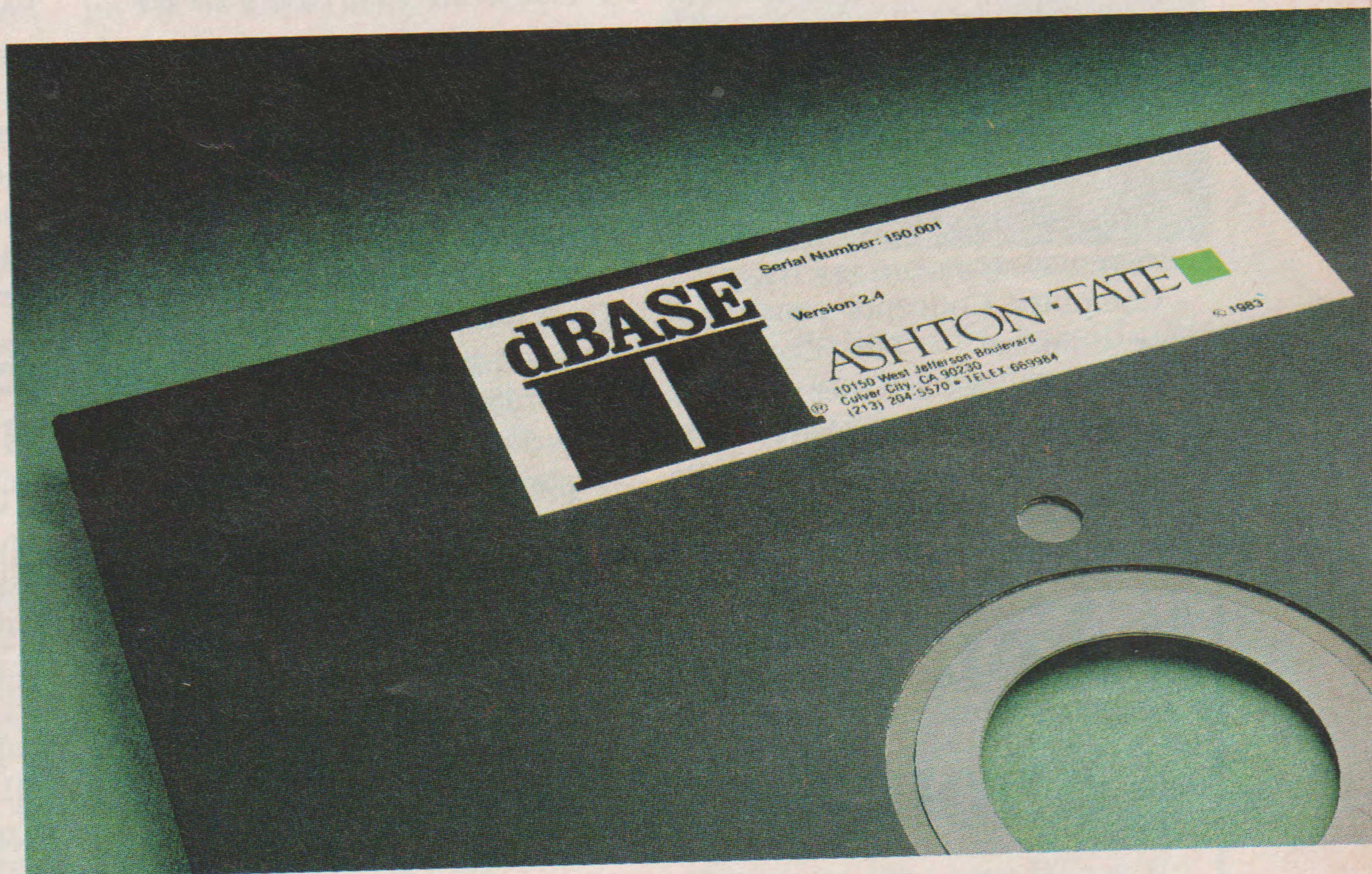
Knowledge is power.

With dBASE II, you can quickly and easily create a full business information system that does exactly what you need done, a system that will handle today's problems yet grow with you.

All of your data is at your fingertips with dBASE II. Using simple English-like commands, you add, delete, edit, display, print and manipulate your information.

Once you've decided on what you want done, you save the instructions so that even your least experienced personnel can perform the most complex business functions with two words: *Do Invoices*, *Do Payroll*, *Do anything that needs to be done*.

dBASE II is the most advanced information management tool available for your micro. And it's only \$700 (suggested retail price).



A legend in its own time.

Already, books have been written about it. Hundreds of independent businesses are based on it. And other microcomputer programs measure themselves against dBASE II.

To see why, drop by your nearest computer or software store and ask for a demonstration. Then take a package home and use it for 30 days. If it's not everything we said it was, return it and get your money back.

But we think you'll keep it.

Can over 150,000 users be wrong?

For information and pricing on the Special Classroom Version of dBASE II, call Ashton-Tate at (213) 204-5570, extension 120.

Write No. 34 on Inquiry Card

ASHTON-TATE

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© Ashton-Tate 1983.

Software (continued)

64 Kb memory, a monochrome or color monitor and one disk drive, although a color monitor and a second drive are recommended. *Courseware, Inc., San Diego, CA.*
Write No. 204 on Inquiry Card

Seven Courseware Programs in PLATO

Control Data Corp. recently introduced seven PLATO educational courses — four PLATO titles in "Computer Concepts" and three PLATO foreign language titles. All are for use on Apple II+ and IIe microcomputers.

Computer Concepts consists of four courses — The Computer Keyboard, Storage and Memory, Files and Editing, and Databases. The courses are designed to provide students with the fundamentals of

computer concepts.

Junior and senior high school students can expand their foreign language vocabulary with PLATO's French, German and Spanish "Create-A-Vocabulary" lessons. Each language course consists of 250 basic vocabulary words, including nouns, verbs and articles for nouns. *Control Data Corp., Minneapolis, MN.*

Write No. 206 on Inquiry Card

PASCAL for Several Operating Systems

A PASCAL for PC-DOS, MS-DOS, CP/M-86 and CP/M-80 operating systems has been introduced by Borland International.

Named Turbo PASCAL, it takes 28 Kb of disk space and has a built-in, interactive full-screen editor which is WordStar compatible.

During program compilation the cursor jumps directly to the identified error and waits for correction,

making it easy for the operator to handle compilation errors. At run-time, identified errors are directly referred to the source code.

Turbo PASCAL is a fully standard PASCAL implementation. The compiler generates object code and the compiler itself is written in assembly language (Z80 for the 8-bit and 8086 for the 16-bit version).

Due to the compact compiler design, the user can have Turbo PASCAL, program source code and compiled object code simultaneously in RAM. This limits the amount of disk access required and therefore speeds program development. *Borland International, Scotts Valley, CA.*

Write No. 205 on Inquiry Card

Software Rental, Time-Sharing Plans

The UES/EASI and Class Software rental plan furnishes ready-to-run diskettes for the IBM System/34. All of the service plans available are full service programs.

They include instruction manuals, staff training by experts, continuous toll-free telephone support, and frequent software updating.

The programs included in the Easy Access School Information (EASI) plan include: the student management system, the accounts payable system, the financial aid system, the payroll system, the general ledger system, and the word processing system.

The Time Sharing Plan is an on-line service from your site to in-house computers. *United Education & Software, Fort Lauderdale, FL.*

Write No. 220 on Inquiry Card

Disk Emulator for MagiCalc Software

The Flashcard disk emulator is now offered with MagiCalc spreadsheet software. The combination of the Flashcard plug-in board from Syntex, Inc., Redmond, Wash., and the MagiCalc software will typically speed up processing time by 1,000

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Write No. 24 on Inquiry Card

per cent over using a standard Apple floppy and average spreadsheet program, according to the makers. The Flashcard solid state disk displays data instantly.

MagiCalc is a new spreadsheet program designed to improve upon VisiCalc; it is fully compatible with existing VisiCalc files.

The Flashcard is packaged alone with operating diskettes for DOS, CP/M and PASCAL for compatibility with programs such as WordStar, dBase II and other popular brands. For CP/M programs, the Flashcard can be configured to emulate a 256 Kb 8" floppy disk. *Synetix Inc., Redmond, WA.*

Write No. 207 on Inquiry Card

NaturalLink Defines Database Inquiries

Using NaturalLink by Texas Instruments the office worker or professional can converse with a microcomputer in ordinary English.

NaturalLink uses artificial intelligence (AI) in letting the computer define the boundaries of database inquiries and allows the user to extract information without any prior knowledge of special computer language.



USES ARTIFICIAL INTELLIGENCE

When Texas Instruments began developing NaturalLink, researchers questioned the very foundation of open-ended, conversational natural language systems. Out of this

research came a new assumption: people don't really care how many ways they can ask a question; they just want to get the answer. Open-ended choices that may not produce results are not as important as developing an easily-understood method of getting information quickly.

To accomplish this, NaturalLink utilizes windows from which the user chooses English words or phrases to form a complete sentence that queries the database. The computer guides the querying by offering options in each window that are based upon previously-selected options.

With NaturalLink, there is very limited typing, and command syntax is developed by the computer; thus, command errors are virtually eliminated. Moreover, because NaturalLink controls the questions that can be asked, the possibility of making an invalid inquiry is eliminated. Since the system uses complete English language sentences as commands, it can be operated by someone with no computer experience. *Texas Instruments, Inc., Austin, TX.*

Write No. 224 on Inquiry Card

Courseware for the NEC Trek

NEC Home Electronics, Inc., has teamed with Walt Disney Telecommunications and Non-Theatric Co., to introduce a new line of educational software compatible with the NEC Trek personal computer. The programs feature Disney characters and animation in interactive, entertaining and educational video games designed to build a child's skills in math, language arts, science, logical thinking, visual discrimination, and more.

During the past two years, Disney has worked with educational consultants and NEC to produce a series of five programs primarily for learning levels between the ages of 3 and 18 years. Each program available in either disk or cassette form will contain two educational games

designed for the same age group. Included in the cast of characters are Mickey Mouse, Minnie, Pluto, Winnie the Pooh and Snow White.

NEC Trek will attach to any standard black and white or color television or one of NEC's composite video monitors.



FEATURES DISNEY CHARACTERS

The system was specifically designed as a "confidence-building" entry-level computer for the home and school. It is a high-resolution system that uses nine colors to enhance text and graphics. It has three independent sound generators to produce music over an eight-octave range. Children can manipulate images on the screen using NEC's touch panel or a joystick.

NEC Trek features programming capabilities in BASIC. *NEC Home Electronics, Elk Grove Village, IL.*
Write No. 258 on Inquiry Card

Multiple Access for VAX VMS

System Industries has introduced a multiple access control system for VAX VMS users, 9920 Simacs (S/I Multi-Access Control System). Simacs enhances the availability of on-line storage products to users with more than one VAX CPU. It provides common storage for up to eight local CPUs; file integrity for both read and write update operations; VAX hardware (780, 750, 730) compatibility, and user transparent VMS software compatibility. *System Industries, Milpitas, CA.*

Write No. 227 on Inquiry Card

(continued on page 154)

Software (continued)

Template Supports PS300, AED 512 & 767

Megatek Corp.'s "Template" graphics software package now supports Evans & Sutherland PS300 and Advanced Electronics Design 512 or 767 graphics terminals, using new device-interface software modules.

The new device interface for the PS300 graphics workstation includes Megatek's proprietary device-intelligent support model, which allows use of the advanced graphics features of the workstation without device-dependent programming.

The device interface for the 512 and 767 terminals also includes the device-intelligent support model.

Hardware features of terminals supported by Template include: line generation (five styles), hardware characters (four sizes), polygon fill, selective erase, and color lookup table settings.

Template provides the routines needed to create, display, modify and save graphics information for a variety of applications, such as scientific analysis, financial reporting, process control or engineering design. *Megatek Corp., San Diego, CA.*

Write No. 259 on Inquiry Card

Math Courseware for Ages 6-12

Math Blaster, courseware for Apple and IBM computers, has been developed by Davidson & Associates. The program contains over 600 problems in addition, subtraction, multiplication, division, fractions and decimals for children aged 6 through 12.

Animation, color and optional sound effects are used to enhance the program. Designed by educational specialists, Math Blaster has been classroom tested. According to the makers, it offers the student positive reinforcement for each

learning accomplishment. The student is always praised for a correct response and never punished for an incorrect one.

The program includes an arcade game based on math mastery. A high game score is achieved by high math skills. The program comes with an editor for parents and teachers who may enter additional problems for use with all four Math Blaster activities. *Davidson & Associates, Rancho Palos Verdes, CA.*

Write No. 260 on Inquiry Card

Software for School Operations

Elliot Software Systems is now offering the Headmaster, a fully integrated, 11-program school operations system. The Headmaster's programs are designed for both school administrators and teachers.

Featured in the seven Headmaster Assistants are the Attendance Monitor, which records daily and by period attendance; the Scheduler, which permits "best-possible" scheduling by employing a conflict matrix, and the Grade-Keeper, a report card program which computes honor roll and class rank and generates special group reports for advisors and coaches.

The three Teacher's Aids are designed to remedy the tedium of writing and scoring tests and record-keeping. The Test Writer generates up to ten versions of the same test with answer sheets and explanations.

The Record Book with Calculator permits teacher's choice for weighing and grouping tests and assignments in final grade calculation and automatically records final grades on the Grade Keeper.

Programs are available individually or as a unit. Full integration permits one-time data entry. All programs are written for Apple or Apple-compatible machines, 48 Kb or greater. *Elliot Software Systems, Duluth, MN.*

Write No. 208 on Inquiry Card

Training Course for IBM System/38

Automated Training Systems (ATS) recently announced "Introduction to the System/38," a self-study training course which provides an overview of the IBM System/38 for workstation operators, user/managers, system operators, data processing managers, system analysts and programmers.

Some of the subjects included are: peripherals, utilities, data bases, program products, telecommunications, programming languages and the operating system.

Introduction to the System/38 joins six other ATS courses on the System/38—Work Station Operator Training, CL Operations, CL Programming, Entry Level RPG III, RPG III and Structured Programming, and Interactive RPG III. *Automated Training Systems, Woodland Hills, CA.*

Write No. 225 on Inquiry Card

Software for Elementary Schools

Telos Software Products recently released "TeloSchool," a microcomputer-based administrative software package designed specifically for the needs of elementary schools.

TeloSchool stores up to 400 students' names on a single data diskette. It can track up to 48 items of information about each student, 36 of which are defined by the school staff. Once the information is entered from the keyboard onto the data diskette, TeloSchool sorts the information on up to five data items at once and will print reports that will display up to 13 items.

TeloSchool runs on the Apple IIe and II+ (or equivalent) microcomputers, with a minimum of two disk drives and a printer.

Schools that have more than 400 students can store more student records on extra data disks and can run sorts and reports for each data diskette. Or they may use extra disk

drives. TeloSchool will support up to four drives and will read data from all drives and print standard or customized reports and mailing labels automatically.

The package includes: a program diskette, an owner's manual, a step-by-step training course, and a sample student record data base diskette for use with the course. *Telos Software Products, Santa Monica, CA.*

Write No. 213 on Inquiry Card

Scoring Software for All Levels

QuickScore software for scoring, evaluating and reporting test results is available for Chatsworth and Mountain 1100A card readers. QuickScore was released after field testing around the country and is designed for teachers working at all educational levels.

QuickScore scores up to 250 students' names at a time by group or section. It also assigns weights to test items and provides item analysis. Hand-scored points are entered automatically into grade calculation. Other features include: optional alphabetization, matching and multiple marks, and a card testing routine. It will run on the Apple II and IIe microcomputers. *PICA Foundation, Inc., Charlotte, NC.*

Write No. 230 on Inquiry Card

Math Utilities for Apple II, IIe

Calcu-Plot, a new package of mathematical utilities that transforms complex equations into easy-to-read graphics, is available for the Apple II and IIe computers from Human Systems Dynamics.

The program accepts data from keyboard, disk files, and even from print format VisiCalc files. Solved equations can be plotted one at a time, or in sets of two or three—all on the same graph.

The program creates sequential disk files that can be used with all the other products offered by Human Systems Dynamics.

The user may enter his own equations or select from 16 Cartesian or nine Polar standard equations with unlimited choice of constants and limits. The system will print the graph on an Epson printer, or save the graph to disk for printing with any other printer. *Human Systems Dynamics, Northridge, CA.*

Write No. 231 on Inquiry Card

Program Records Locks & Lockers

Locks and Lockers is a computer program for record keeping and information retrieval for locks, lockers, and lock combinations most commonly used in a school physical education or science lab setting.

The program provides for easy entry of and access to information on lock and locker assignments for up to 1,600 pupils on a single diskette. This program allows the teacher to: record the student name, locker number, lock number, and combination as assignments are made; check that the correct lock is being returned; display all the information on locks and lockers for a class; find who has a particular lock; look up a combination, and find who has a particular locker. Access is also built in for subroutines written by the user.

Locks and Lockers runs on any Apple or compatible computer with 48 Kb of memory and one disk drive. *Persimmon Software, Greensboro, NC.*

Write No. 232 on Inquiry Card

Software Hones Graphing Skills

Apple Function Explorer: Understanding the Sense and Shape of Equations is a tutorial designed to help students understand the relationship between graph and equation. Makers say it makes practicing graphing a challenging and entertaining experience.

The program illustrates equations typically taught, such as parabola, ellipse, sine wave, quadratic equa-

tions. The disk contains programs for use both in the Cartesian or rectangular coordinate system and in the Polar coordinate system. Equations can be entered and plotted. Two or more can be plotted on the same graphic screen, permitting the student to see how, when equations are superimposed upon each other, the resulting curve changes in appearance. A 16-page manual is included. *K-12 Micro-Media, Woodcliff Lake, NJ.*

Write No. 233 on Inquiry Card

Video Training in Computer Literacy

The Computer Literacy Training Systems' series of video tapes is designed to introduce teachers, students, parents and business personnel to the basic operations of computers and their component parts.

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Software (continued)

No computer hardware is needed. All that is required is a video cassette player. The presentations assume no prior computer knowledge on the part of the viewer.

Twenty-minute tapes are available on the following topics: keyboards

and monitors, memory storage devices, printers, and modems.

Personal computer product-specific tapes are available for the Atari 800, Apple IIe, and Commodore 64. Software video tapes include: VisiCalc, PFS and AppleWriter. *Computer Literacy Training Systems, Dallas, TX.*

Write No. 234 on Inquiry Card



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Write No. 62 on Inquiry Card

Game Programs in VIC BASIC

Stimulating Simulations for the VIC is a handbook of 12 simulation game programs written in VIC BASIC.

Each program is presented with a listing, a sample run, instructions, and program documentation, including a flowchart and ideas for variations. Each game can be played by one or more players and can be modified to a variety of difficulty levels.

The 12 programs include: Art Auction, Monster Chase, Lost Treasure, Gone Fishing, Space Flight, Starship Alpha, Forest Fire, Nautical Navigation, Business Management, Rare Birds, Diamond Thief, and The Devil's Dungeon. *Hayden Book Co., Inc., Rochelle Park, NJ.*

Write No. 235 on Inquiry Card

Program Prepares Students for SAT

The HBJ Computer SAT program was designed to help students prepare for the Scholastic Aptitude Test (SAT). The program involves the student in a "two-way conversation" with the microcomputer to provide a systematic learning experience. The student controls the pace of the study.

The program includes: a review of printed text, which gives the student strategies for taking the exam, and shows what kinds of questions regularly appear; four practice tests patterned after the actual SAT; a timing and scoring function, and a diagnosis and study plan.

Strengths and weaknesses are diagnosed in 15 key areas. The program also prescribes appropriate drills and review. It requires an Apple computer with 48 Kb or the TRS-80 Model III with 48 Kb. *Harcourt Brace Javanovich, Inc., San Diego, CA.*

Write No. 236 on Inquiry Card

Library Processes System for TRS-80

The Library Processes System developed by Educomp is designed as a tool for librarians and is geared toward those with little expertise in the use of computers.

Designed by a librarian and a computer programmer, the program was written for school libraries and small public libraries.

It requires a TRS-80 Model III with 48 Kb, a two disk system, with a heavy-duty tractor feed printer, such as the TRS Lineprinter V or DMP 4000. It is also available for the TRS-80 Model I.

The system features access to full sets of catalog cards and book lists. It sorts numerically by call numbers and alphabetically by author. It allows Dewey or LC cataloging, designates reference, paperback, professional or "easy" books, and subject searches by key word or groups of call numbers. Audio visual listings can be entered in a catalog format, as well as by catalog cards. *Educomp, Vinita, OK.*

Write No. 262 on Inquiry Card

Diet Analysis for Apple, IBM PC

Nutritionist, an interactive graphics diet analysis program for the Apple, IBM PC and CP/M-compatible computers, has been released by N-Squared Computing.

The program graphically displays nutritive analyses of foods and diets, both in weight and percent of recommended daily allowances for 19 nutrients. It is designed to indicate deficiencies and excesses, identify their sources, and determine optimum foods for a naturally-balanced diet.

The system includes a program diskette, user manual, USDA reference source, index, and data base diskette, with 730 foods and unlimited expandability. The Nutritionist is being used by dietitians, hospitals and educational systems,

as well as by homemakers, according to N-Squared Computing. It requires an IBM PC with 64 Kb of memory and one drive. The Apple II version requires 48 Kb of memory and one drive. *N-Squared Computing, Silverton, OR.*

Write No. 263 on Inquiry Card

Software Calculates Astronomical Data

Astrocalc is astronomical software for the amateur, the professional, and the teacher of astronomy — anyone interested in the sky and its observation. The user inputs date, time and location and Astrocalc calculates and displays basic data for the sun, moon and all planets.

Output includes: rising and setting times and brightness magnitudes; right ascension and declination; altitude and azimuth; ecliptic latitude and longitude; angular size; inclination, eccentricity and ascend-

ing node; mean and true anomalies; local sidereal time and Greenwich mean and sidereal time; beginning and ending of twilight, and Julian day number and solar equation time.

Zephyr Services, Pittsburgh, PA.

Write No. 218 on Inquiry Card

Video on APT Part Programming

A seminar course by Associate Professor C.E. Drayton of Northern Illinois University is now available through Ingersoll Engineers in complete videotape form.

Titled "Basic APT Part Programming," the 40-hour course is offered in popular videotape sizes and formats.

It is structured for either monitored groups or self-paced learning. *Ingersoll Engineers, Inc., Rockford, IL.*

Write No. 216 on Inquiry Card

(continued on page 159)

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Software (continued)

Software Designed to Organize Videos

The "Video Tape Tracker," developed by Prosoft, is designed to help the user organize a video library quickly and easily.

The program can store and manage over 1,000 titles and print quick-reference lists by tape number and/or movie title. It also can search through the list by tape, title or performer and print numbered, titled labels. It requires a TRS-80 Model I or III with two disks and 48 Kb. *Prosoft, North Hollywood, CA.*

Write No. 237 on Inquiry Card

Creative Graphics Version 2.0

Creative Graphics is a versatile, general-purpose drawing program designed for production and presentation of color graphics in medium and high resolution.

New features of Version 2.0 include: text variation, vector symbol creation, simple animation and overlays, a recoloring function, and DOS 2.0 compatibility. It was designed for teaching computer graphics or literacy, production of dynamic A/V aids (slides, prints, hard copy, overheads), and developing and tailoring computer-assisted instruction. *Accupipe Corporation, Paoli, PA.*

Write No. 238 on Inquiry Card

Multi-Lingual Program for Apples

The Great Creator, a multi-lingual program for Apple computers, gives the user the ability to create multiple choice questionnaires on the computer in several languages.

It contains character sets for letters with accents in 16 different languages in addition to English: Spanish, French, German, Danish/Norwegian, Finnish/Swedish, Hawai-

ian, Hungarian, Italian, Latin/Dutch, Polish, Portuguese, Czech, and Turkish.

Features of the program include: a word processor text entry system; upper/lower case display and accented letters without additional hardware; automatic wrap-around placement of text on the screen; a scoring system to keep track of each responder's progress, and printout of questionnaires in various forms. *The Professor, Swanton, VT.*
Write No. 239 on Inquiry Card

Translating Word Processor

Challenge Systems Inc., has released a prototype of its new translating word processors—the TWP. The TWP provides full text translation by automatically correcting syntax, sentence structure, verb conjugation and other similar functions.

The TWP translates at a rate of 4,000 to 5,000 words an hour, with an accuracy factor of 90 percent, according to the makers. Throughout the translation process, TWP applies algorithms to ensure grammatical accuracy and draws from the contents of three dictionaries. The largest dictionary contains 50,000 generic words; the second consists of 5,000 words (which are unique to the user's specific industry or profession) and the third is customized for the user of each installation.

Each TWP system includes 128 Kb of random access memory, 20 Mb of hard disk storage, a CRT workstation with detached multilingual keyboard, a daisy-wheel printer with Teletex international character set, and dual 8" floppy disk drives. *Systems Sales International, Austin, TX.*

Write No. 240 on Inquiry Card

(continued on page 160)



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Software (continued)

Software Explores Beginning Science

Software Arts recently introduced a TK!SolverPack for Introductory Science. The third in a series of application packages for the TK!Solver program, the Introductory Science package includes 12 models, each of which contains the necessary equations, values and tables for solving problems in the areas of physics, chemistry and biology.

The models in the TK!SolverPack can be used in introductory level biology, chemistry and physics courses in secondary schools and colleges. The models are usable as is or they can be modified by the user.

Subjects addressed in the models include: population growth, motion with constant acceleration, electrical circuit, and chemical equations. The program is available for the IBM PC, the Digital Professional 350, the Digital Rainbow 100 and the Wang professional computer. *Software Arts, New York, NY.*

Write No. 241 on Inquiry Card

Color Graphics

PCsoftware has announced the release of PCcrayon, a multi-use color graphics program for the IBM PC.

The system is designed to allow users to create animated drawings and graphic symbols, store them, and reproduce them for later use in slide show presentations.

PCcrayon is equipped with single-keystroke commands which allow the user to make changes in colors and sizes of symbols, or move segments around from one location to another.

Data is input via keyboard; plotting of data points via the space bar. With as few as three data points, PCcrayon can create arcs. Other options include dots, lines and circles. The program comes

complete with documentation and a tutorial program. *PCsoftware of San Diego, San Diego, CA.*

Write No. 242 on Inquiry Card

Tutorial Program for BASIC on IBM PC

The PC-Prof. and Eagle Software, Inc., recently released the BASIC Prof., an interactive tutorial program for BASIC on the IBM PC.

The BASIC Prof. allows the user to learn and experiment with programming in the BASIC interpreter, the actual programming environment of the personal computer.

The BASIC Prof. works on any PC, XT or compatible computer with an 80-column display and at least 64 Kb of memory and one disk drive. It gives sample programs to run and modify, animated examples that illustrate concepts such as looping, arrays and sorting, and unconstrained access to the BASIC interpreter. It covers approximately 150 BASIC statements, commands and functions. *PC-Prof., Salina, KS.*

Write No. 243 on Inquiry Card

Software Teaches BASIC Programming

Orion Training Systems' Introduction to BASIC Programming is designed to help the initial computer user learn to program.

The package consists of a four-diskette series that teaches computer literacy while training the student in BASIC programming. Included is a manual with operation instructions and supplementary exercises. It requires the Apple II+ or IIe.

Features of the package include: interactive and self-paced instruction; selection of any module within a lesson from the menu; assistance with the touch of a key, and a quiz module in each lesson which is automatically scored and evaluated by the computer.

According to the makers, the package is designed to take a student with no computer knowledge

to the point where he or she can comfortably operate a computer. It can be used to assist the teacher in the classroom or stand on its own. *Orion Training Systems, Dallastown, PA.*

Write No. 244 on Inquiry Card

Package Features Word-Game Exercises

Quilt Letters, an educational computer software package for junior and senior high school students, features three word-game exercises in vocabulary building. Students are encouraged to look up the meaning of all unfamiliar words in the exercises.

The three programs—Quilt, Grid, and Supersix—give the student practice in the use of words of four letters on a four-by-four grid. The words are checked against a 2,400 word dictionary.

The operation of all programs is by Menu-Selection. Detailed instructions are displayed before each word-game exercise. The programs require a TRS-80, Model III with 48 Kb of memory, and two disk drives. *Joseph Nicols Publisher, Tulsa, OK.*

Write No. 245 on Inquiry Card

'Library' Contains Software Programs

Chalk Board, Inc.'s "Leonardo's Library," has been designed to contain more than 30 innovative software packages, spanning six subject areas and five content levels. It is structured to provide an entertaining introduction to visual arts, music, mathematics, science, language arts, and social studies.

Leonardo's Library is based on the concepts of experiential, "open-ended" learning originated by Swiss educator Jean Piaget and further developed by mathematician Seymour Papert, co-developer of the LOGO programming language. Several packages are written in LOGO-like language, and all employ the reasoning and logical skills devel-

opment process associated with Papert and LOGO.

With PowerPad and Leonardo's Library, the home computer becomes an artist's canvas, a golf course, a musical instrument, or a geometry puzzle, depending on the program being used.

The software is designed to run on the most popular home computers, including Commodore, Atari, Apple and IBM models. Each package includes software in either cartridge or floppy disk format, depending upon which home computer is being used, as well as a tough plastic overlay that is imprinted with function buttons and a manual describing a number of learning activities. *Chalkboard, Inc., Atlanta, GA.*

Write No. 246 on Inquiry Card

Authoring System for the IBM PC

Educators and trainers with no knowledge of programming can create their own computer-assisted instruction courses on the IBM Personal Computer using the new McGraw-Hill Interactive Authoring System.

With the authoring system, the "writer" is guided step-by-step by on-screen directions. The software's Application Screen Simulation Facility enables authors to simulate an 80-character screen for training without using a mainframe computer. This screen can be directed give immediate or delayed feedback on programs and provides assistance if a student has a problem.

With six branching options available, lessons can also include multiple choice, matching or fill-in-the-blank questions. The author can easily incorporate text, color graphics, and videotape segments in the lessons.

Newly-created courses can be edited as they are viewed and then run immediately. Sixteen foreground and eight background colors are available for use in creating

(continued on page 162)

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Software (continued)

graphics and text. Interactive video is compatible with several video players that have a remote control capability. To run the software, the IBM PC should have 128 Kb of memory, two 320-Kb disk drives, a color card and an asynchronous communications card. *McGraw-Hill Interactive Authoring Systems, New York, NY.*

Write No. 247 on Inquiry Card

Statistics Course Includes Lectures

An Engineering Statistics course developed by Colorado State University, consists of ten 30-minute color lectures. It is designed to teach effective use of statistics in meeting budgets, improving productivity and becoming more competitive.

The course allows the user to: determine when and where problems are developing in a production process; evaluate a product; provide confirmation for advertising claims; compare a product with the competition, and assess a product for government regulations.

Lecture topics include: sampling and descriptive statistics; the normal distribution and central limit theorem; one- and two-sample tests for qualitative data; probability and the binomial distribution; hypergeometric and poisson distributions, and more. *Colorado State University, Ft. Collins, CO.*

Write No. 248 on Inquiry Card

Multi-Lingual Word Processor

The Type-Writer transforms the Apple computer into a multi-lingual word processor, allowing the user to create, modify and print text in ten languages in addition to English.

The languages that may be printed are: Spanish, French, German, Danish/Norwegian, Finnish/Swedish, Hawaiian, Hungarian and Italian.

Features of Type-Writer include: upper/lower case display without additional hardware; ease in inserting, deleting or changing characters, words, lines or paragraphs; search for and replacement of words, phrases and more, and a preview of text in graphic form on the screen. The program will modify margins before printing takes place. The Type-Writer requires the Apple II+, IIe or Apple-compatible computers. *The Professor, Swanton, VT.*

Write No. 249 on Inquiry Card

Program Taps Total Memory of IBM PC

Professional BASIC, a new implementation of the BASIC language, allows programmers to use all the memory of the IBM PC.

Other features include: dynamic syntax checking; use of the 8087 math coprocessors; dynamic trace of program execution; the setting

up of conditional breakpoints; scrolling up and down through a program listing and execution history; use of labels for referencing lines; generation of cross references on variable names; use of double precision integers, and automatic reproduction of variable names while coding. *Morgan Computing Co., Dallas, TX.*

Write No. 250 on Inquiry Card

Software Teaches Human Anatomy

Microscopic Journey, an educational game that involves guiding a tiny ship through the human body's inner space, is now available from Hayden Software.

The object of the adventure is to seek out and destroy alien invaders that threaten to destroy the body's most important organs. The player must maneuver the ship deftly through the body's passageways and employ a surgeon's skill with the laser beam in defending against dangerous bacterial and viral agents, in addition to the swarms of leukocytes the body has sent out to destroy the ship—which it also senses as an alien presence.

The anatomical references that are made in the game are accurate reflections of the human body, giving the player a basic view of human anatomy. *Hayden Software Co., Lowell, MA.*

Write No. 251 on Inquiry Card

LOGO Language for the IBM PC

PC LOGO has a LISP-based design the IBM PC, has been released by Harvard Associates. It is designed to operate in 64 Kb and is expandable to 128 Kb for IBM PC's with the available memory.

PC LOGO has a lisp-based design for language extension and is assembly-coded for fast performance. It will run in MS/DOS, providing MS/DOS compatible file operations. The software includes a complete tutorial and technical

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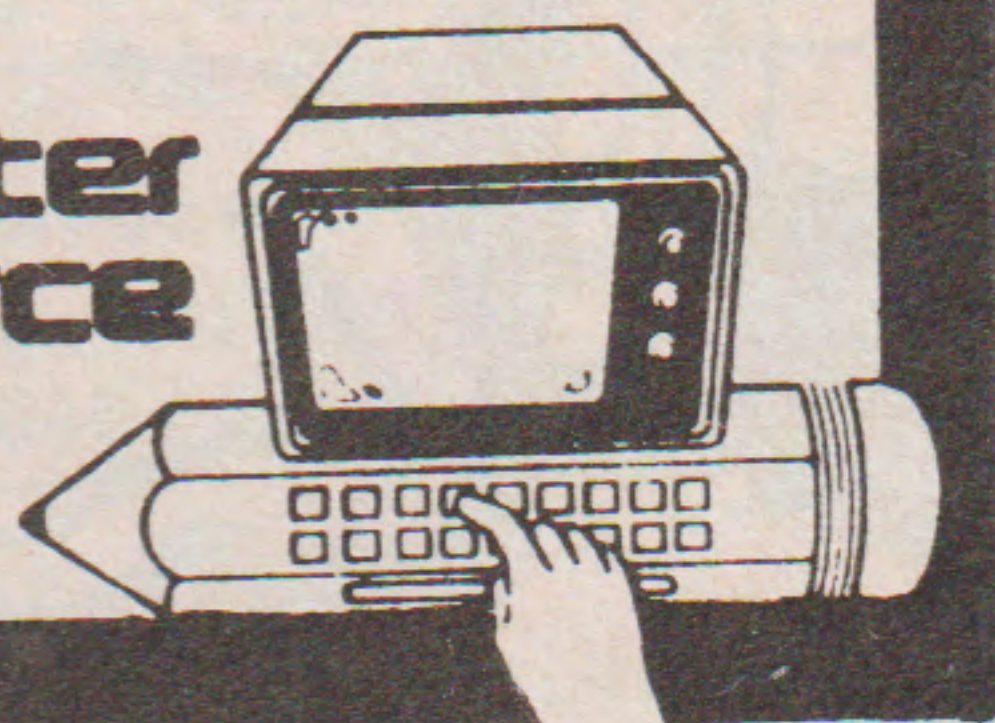
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reference manual.

PC LOGO takes advantage of the capabilities of the IBM PC, with such features as programmable function keys and enhanced editing capabilities. It permits communication through a serial port with such peripheral devices as a mouse and mechanical turtle. It comes complete with a language disk and backup, utilities disk, tutorial and reference manual. *Harvard Associates, Somerville, MA.*

Write No. 252 on Inquiry Card

Compatible with Commodore 64

Several math and English programs compatible with the Commodore 64 are available from Setzer Educational Service.

The programs include: RCT Math for grades 6 through 12; Supermath, covering 20 non-routine mathematical problems for creative problem solvers in grades 5 through 12; Sequential Math, more than 100 programs covering 20 non-routine mathematical problems for creative Integrated Math sequence; Categorization, vocabulary programs for junior high; Math Invasion games, and SAT verbal preparation drill programs.

All of the programs were developed by Andrew Setzer, coordinator of a computer-assisted instruction program in a junior high school on Long Island, N.Y. The programs are written in BASIC on a Commodore PET. *Setzer Educational Services, Flushing, NY.*

Write No. 253 on Inquiry Card

Program Simplifies Word Processing

Wordvision, a program for word processing, is designed to free the user from having to learn command codes and various modes, such as edit and insert.

Frequently-used controls are activated with the special keys. Other controls are presented and explained as they are needed. What is shown

on the computer screen always matches exactly what would be printed out on paper if the user commanded its printing at that moment. With computers with color displays, Wordvision makes use of color to communicate details of the program's operation.

Wordvision lacks some of the elaborate formatting features that are found in high-cost word processing programs, according to the makers. But they note add-on "Powerback" programs will be sold for those who need the special features. *Bruce & James, Program Publishers, Inc., San Francisco, CA.*

Write No. 254 on Inquiry Card

Chemistry, Biology Programs for Apples

The Educational Computing Network recently released a set of more than 100 programs in high school chemistry and biology for the Apple II+ and IIe computers.

The programs are an assortment of problem-solving, review and tutorial, and practice. They are designed to complement lectures in any standard high school chemistry and biology course. The topics include: acids, Boyle's/Charles law, chemical formulas, viruses, human body, genetics, gases, mass problems, and stoichiometry.

The programs come on four disk sides with indices and documentation. *Educational Computing Network, Riverside, CA.*

Write No. 215 on Inquiry Card

UniForm Interfaces Kaypro Computer

Producers of the Kaypro computer have introduced new software that allows Kaypro computers to read and write disks in the formats of the Osborne I (single- and double-density), the Xerox 820 and 820 II, and the Radio Shack TRS-80 Model 1.

All new machines will be packaged with two new programs, called UniForm, which are incorporated

onto the system's CP/M S-Basic diskette.

UniForm is a pair of programs, Setdisk and Initdisk, which allows Kaypro users to transfer files from the Osborne, Xerox and TRS-80 machines on Kaypro machines, or to permit Kaypro files to be used by machines produced by other manufacturers.

Initdisk allows the user to "initialize," or change, a disk to any of the supported formats. It enables generation of initialized disks usable on different brand machines.

Setdisk is used to select the desired disk format for Drive B on the Kaypro II. Files are easily copied between Kaypro II disk format and the selected format by using the CP/M "PIP" command. *Non-Linear Systems, Inc., Solana Beach CA.*

Write No. 255 on Inquiry Card

(continued on page 164)

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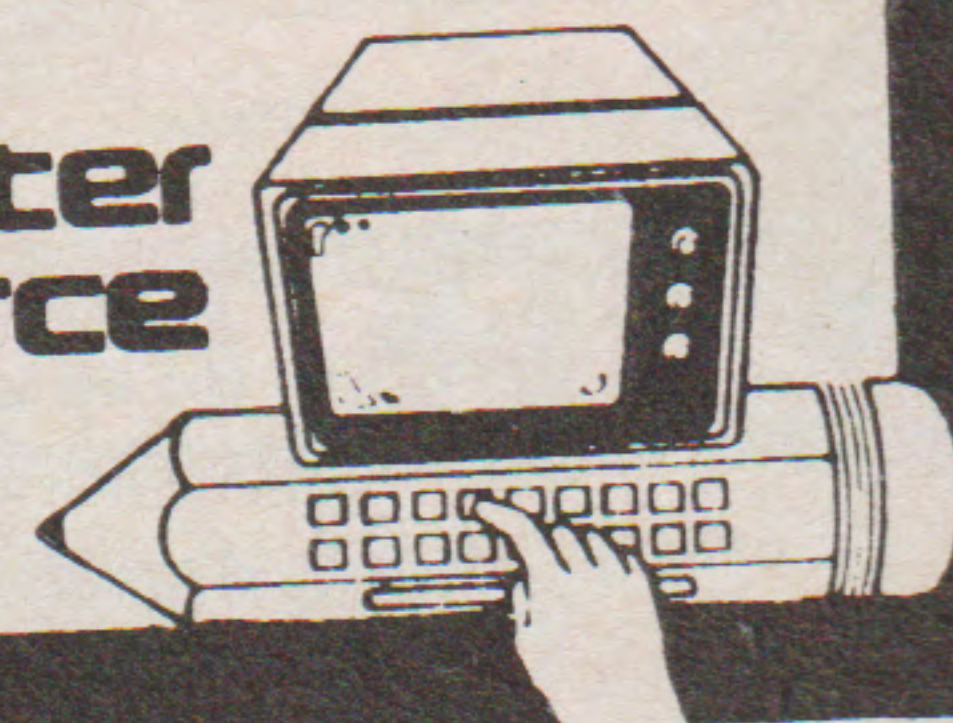
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Software (continued)

Package Creates Robot Programs

Androbot, Inc., has announced a programmer's package for B.O.B., offering users the ability of creating original programs to enhance the sophisticated home robot's on-board speech, movement, and navigating functions.

The package includes the Androbot Control Language, "ACL," designed for optimum "user friendliness." It includes high-level controls for ordering a variety of mechanical movements which are otherwise difficult and time-consuming to program. All controls and the instruction manual are written in easy-to-understand, non-technical language, according to the makers.

To program B.O.B. with this special Androbot option, any terminal

or computer with a serial interface may be utilized, including products currently on the market. During the programming process, B.O.B. is connected via cable to the terminal, while a blank cartridge is inserted into the "Androbus" onto which information is imprinted. Following programming, with the cable detached, B.O.B. will be able to repeat the actions stored on the cartridge as many times as the user chooses. *Androbot, Inc., Sunnyvale, CA.*

Write No. 256 on Inquiry Card

Software for Word Processing

Samna Word, a word processing package for personal computers, has been released by the Samna Corp. The package can duplicate anything a dedicated word processor can deliver, according to the makers.

Samna Word features horizontal scroll, a "fold" feature that lets the user compare left and right margin columns, automatic alignment of numbers in columns, format flexibility, word search, and letter-perfect reproduction.

The program is designed to take full advantage of all the functions of the IBM PC, the DEC Rainbow and the TI Professional computer. The Samna Word package has been programmed separately for each computer. *Samna Corporation, Atlanta, GA.*

Write No. 257 on Inquiry Card

Software Support for Add-on Systems

Tall Tree Systems recently released Windrive, software support for add-on hard disk systems for the PC, XT or compatible machines. In addition to supporting a variety of hard disks, Windrive enables the user to divide the disk up into multiple volumes, providing a method of organizing vast storage spaces used by hard disk systems.

Windrive supports the addition of Datamac, Davong, QCS, VR Data,

and Corvus hard disk systems to a personal computer or compatible machine. Windrive also supports any hard disk using the Xebex, Western Digital, or DTC host adaptors or controller boards.

Windrive divides up the hard disk by creating individual volumes (virtual drives) on the hard disk. It provides each user with an array of 33 possible volumes. It also includes Makvol, a utility that creates volumes within volumes, providing another way of organizing the hard disk. *Tall Tree Systems, Palo Alto, CA.*

Write No. 222 on Inquiry Card

Courses on English as 2nd Language

Two new PLATO computer-based education courses designed to teach English as a second language are now available in the United States and abroad, according to the producer of the courses, Control Data Corp.

One course is designed to improve the English of Spanish-speaking people in a bilingual environment and the other to strengthen written and oral skills of non-English speaking young adults in the U.S. or in non-English speaking countries.

The "English as a Second Language for Spanish Speakers" course is designed to be instructor-independent and concentrates on strengthening reading, vocabulary and grammar skills.

The second 75-hour multi-media course, called "English Simply Learned," is designed for young adults literate in their native languages who wish to learn English as a second language for vocational, professional or personal reasons.

Both courses, which are accompanied by audio tapes, reflect the fundamentals of adult learning theories and are based on practical communication rather than on a strict grammatical approach to language acquisition. *Control Data Corp., Minneapolis, MN.*

Write No. 221 on Inquiry Card

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Write No. 102 on Inquiry Card

New Products

IBM PCjr Features Cordless Keyboard

Called the IBM PCjr, IBM's new 16-bit microcomputer features a 62-key cordless keyboard, 64 Kb of user memory in addition to 64 Kb of ROM, and a combined video output which can display up to 40 columns of information on any standard television set.

For single installations, the keyboard can operate the computer



INSTRUCTIONAL BOOKLET INCLUDED

from up to 20 feet away. But for classrooms containing multiple IBM PCjr units, an optional connector cord is required.

Deliveries are expected to begin the end of March on two versions of the computer. The standard unit includes CPU with 64 Kb of user memory, and the battery-operated programmable keyboard. An enhanced model features 128 Kb of user memory, plus a 360 Kb double-sided, double-density 5-1/4" diskette drive capable of using either single- or double-sided diskettes. Data display is increased to 80 columns.

Available as options are internal or external modems, joysticks, a thermal printer, and connectors for light pens, cassette recorders and an external amplifier with speaker.

The new micro utilizes the IBM Personal Computer Disk Operating

System (DOS) 2.1, which is compatible with many diskette programs written for the IBM PC or IBM PC/XT, including more than 30 from the manufacturer and several hundred from other sources.

In a companion announcement, IBM introduced a low-cost 50 cps thermal printer, and a 20 cps color printer which can produce documents and graphics in up to eight colors. Additionally, the company announced the IBM PCjr BASIC cartridge, which supports enhanced display and sound capabilities, light pens, joysticks, three-voice sound and asynchronous communications. *IBM, Delray Beach, FL.*

Write No. 350 on Inquiry Card

Flat Face CRT Display

Dotronix has released a 7" flat face CRT display with a 29 mm neck. According to the makers, it offers high resolution suitable for photographic applications and other critical display functions.

The tube is available in any listed phosphor, including the new European amber. It may be supplied in both frame and kit versions. It requires 24 VDC at 40 watts.

The high performance display may be specified with a horizontal rate of up to 40 KHz. Applications include terminals, personal computers, medical equipment or computer diagnostic devices. *Dotronix, New Brighton, MN.*

Write No. 348 on Inquiry Card

Workstation for LSI 11/2, LSI 11/23

Netpac-95, a workstation addition to Netcom's family of LSI-11 enclosures, features a wide range of Digital's VT100 options, as well as a full six-slot quad backplane, internal power supplies and optional mass storage.

Each Netpack-95 includes a 305 mm (12-inch) diagonally-measured video display, the keyboard features of the VT100, the terminal controller module, reliable internal linear

power supplies, internal cooling and an RS-232 serial port.

Netcom also supplies a complete series of LSI-11 processors, memory modules, interface modules, and mass storage options which can be installed into the backplane of the Netpac-95 to form a microcomputer system specifically designed to meet processing requirements. *Netcom Products, Inc., Sunnyvale, CA.*

Write No. 342 on Inquiry Card

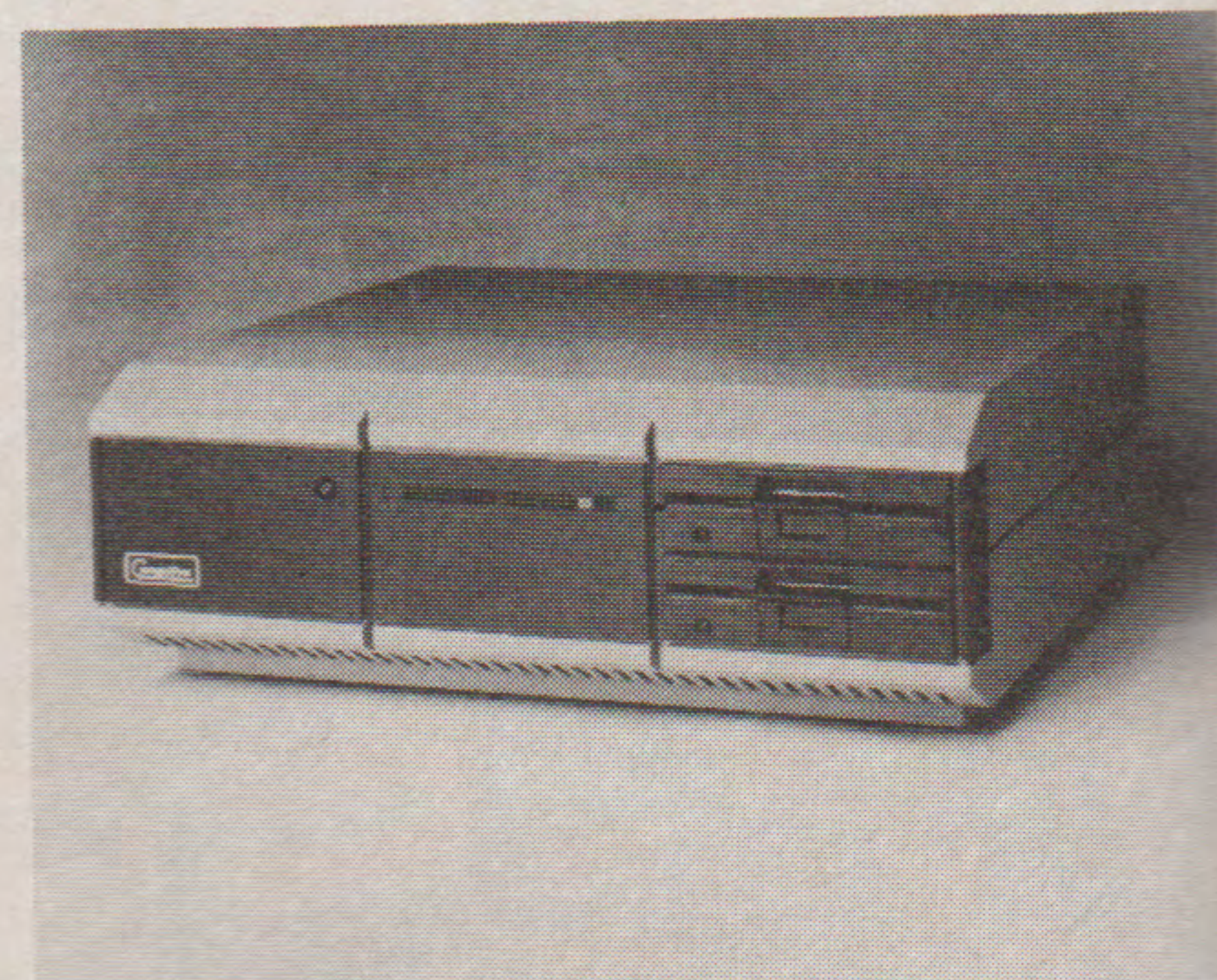
Microcomputer Business System

CompuPro has released a multi-user microcomputer business system, the CompuPro 10, which features concurrent execution of both 8- and 16-bit industry-standard software.

Departing from the company's traditional IEEE 696 orientation, the CompuPro 10 supports word/data processing and communications functions through a shared data base at speeds faster than personal computer-based networks.

Based on an advanced LSI floppy disk controller chip, the new Disk IA is designed for high level industrial, commercial and scientific microcomputer systems.

The SPU-Z Slave Processing Unit for IEEE 696/S-100 environments combines a Z80B microprocessor,



FOUR-USER MULTIPROCESSOR

192 Kb of dynamic memory and two full serial ports. It offers the capabilities of a high-performance 8-bit node in a multi-user, multi-processing environment and is suited for adding 8-bit processing

capability to 16-bit only processor-based systems. *CompuPro, Hayward, CA.*

Write No. 349 on Inquiry Card

Half Track Cooling System

A Half Track cooling system is available from W.T.I. for all Apple II, II+ and IIe computers, including a system stand.

The unit comes with a front panel, illuminated on/off switch, and two three-wire grounded auxillary outlet receptacles mounted on the rear that allow the user the convenience of one button power control for the computer system. The cooling system comes complete with AC surge suppression circuitry and the fan is rated at 16 cubic feet of air per minute for cooling. *Wholesale Technology, Inc., Anaheim, CA.*

Write No. 364 on Inquiry Card

Computer-Controlled Power Conditioner

Topaz Electronics Division has announced the availability of microcomputer-controlled power conditioners for protecting computers against problem-causing voltage variations and power-line noise.

These three-phase power conditioners feature PowerLogic, a new microcomputer technology that greatly increases the speed and accuracy of the power conditioning process. An internal microcomputer continuously monitors the input voltage. If a significant fluctuation occurs, the microcomputer instantly determines the amount of correction necessary and initiates the proper response.

Precise correction is made within one cycle of line frequency, ensuring complete protection against sudden, short-term voltage sags and surges as well as protection against longer-term fluctuations such as brownouts. The power conditioners accept voltage variations as large as

20 percent above or below nominal and reduce them to within 5 percent of nominal, well inside the tolerance range of sensitive electronic equipment.

In addition, power-line noise suppression is achieved through the use of low-pass filters in combination with peak-limiting circuits, resistor-capacitor snubber circuits and dynamic clipping circuits.

These UL listed power conditioners are available in 50 Hz and 60 Hz models and in power ratings from 10 kVA to 100 kVA. All models feature system status monitoring, over-voltage and over-temperature protection and 96 percent power efficiency. *Topaz, Inc., San Diego, CA.*

Write No. 365 on Inquiry Card

Disk Drives with 33 & 45 Mb Capacity

Wicat Systems, Inc., recently announced two new high density 5-1/4" Winchester disk drives with 33 and 45 Mb formatted capacity for Wicat's low end systems. The desk-top microcomputer, System 150 and the new System 155 — an expanded rack mount version of the System 150 — can now more than double their mass storage capabilities. Each system now offers 10, 15, 33 and 45 Mb 5-1/4" drives.

These drives require no additional hardware. They employ the industry standard ST506 controller boards and 5-1/4" floppy disk dimensional compatibility.

They feature a rotary positioner controlled by a digital ramp-up, ramp-down velocity profile, overlapped seek, automatic thermal compensation and a data rate of 5 million bits per second. Their average access time is 50 milliseconds over 640 cylinders.

The drives have a self diagnostic programming element. During start up and running time, ten different fault conditions relating to power supply, the controller, or the drive can be identified. These faults are

indicated by a coded display on the front panel LEDs. The on-board microprocessor selects and implements fast access algorithms and controls actuator damping. It also removes mechanical hysteresis, providing high positioning accuracy. *Wicat Systems, Orem, UT.*

Write No. 366 on Inquiry Card

Multi-Media File with Top Access

Marvel Metal Products' Electronic Environment line now includes a new media file with top access. The file will store hanging letter and legal file folders, data processing printouts, as well as magnetic media in any combination.

The two top panels slide open from the center to provide handy work surfaces on either side of the filing area. Dual wheel casters provide mobility.

The multi-media file is constructed of putty colored embossed leather-textured steel to coordinate with the "Electronic Environment," or any other office decor. Plastic laminate locking tops are available either in oak or charcoal shades. *Marvel Metal Products Co., Chicago, IL.*

Write No. 305 on Inquiry Card

Code Readers for Portable Computers

Bi-Tech Enterprises, Inc., recently announced the availability of Bar Code Readers for the TRS-80 Model 100 and the Epson HX-20 portable computers.

The Bar Code Reader allows users to read industry standard 3 of 9 code and store the results in their computer's memory. The reader features a push-to-read switch and a scanner rate of up to 76 cm/sec. It will read lines as small as 0.3 mm.

The unit is totally self-contained and requires no additional hardware or software to operate, although user interface to existing programs

(continued on page 168)

Products (continued)

is easily accomplished. Each unit comes complete with software and Bar Code Reader. *B.T. Enterprises, Bohemia, NY.*

Write No. 338 on Inquiry Card

Character Generator

Panasonic has introduced a programmable character generator which not only allows users to type captions and store them in a large memory, but also provides a day/date clock, self-timer, and a time-lapse video redording function.

The PK-G900 is a compact, lightweight accessory designed for use with Panasonic's PK-903, PK-957, and PK-973 color video cameras. It is battery operated, weighs approximately a half pound, and measures 6"(D) by 3"(W) by 0.8"(H). It also has an attachment which allows the generator to be mounted on the camera's accessory shoe for easy portability. For use at home, the attachment can be removed so the PK-G900 will lie flat on a table.

The keyboard is designed to make composition quick and easy. It is made of a flat, pressure-sensitive plate offering the full alphabet, numbers 0-9, and 10 symbols. There are also four cursor-position pads which allow for quick corrections without having to back over and erase other material.

A feature of the PK-G900 is its 16 page memory with a built-in save



FOR COLOR VIDEO CAMERAS

function. Each page offers 12 characters per line and five lines of information. This lets the user type captions in advance, store them, and then insert them when needed — even up to a year later, or for the

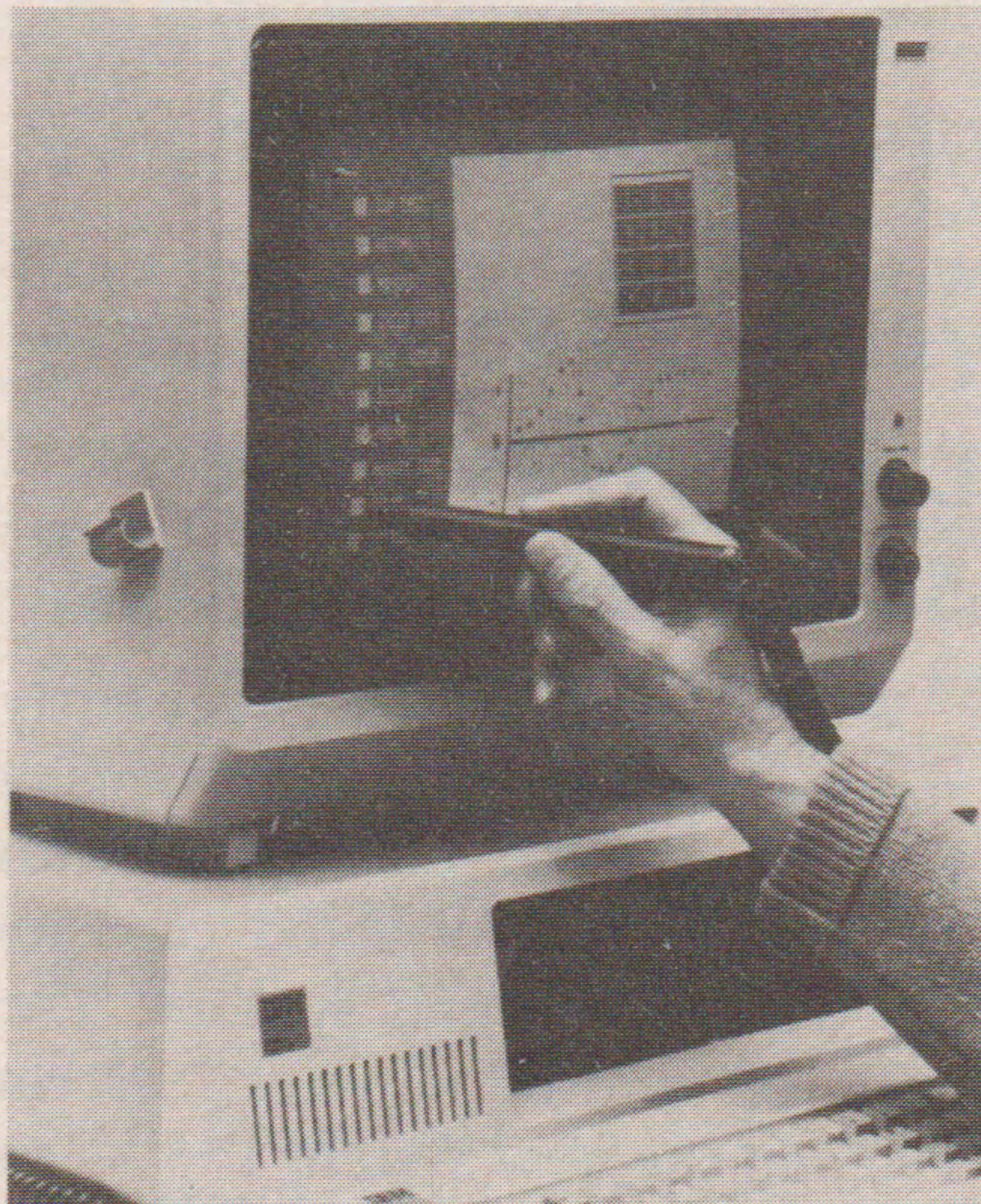
life of the batteries. The typed captions can be video-inserted after taping has been completed. *Panasonic News, Secaucus, NJ.*

Write No. 332 on Inquiry Card

High Resolution Pen for CRTs

Design Technology recently announced the release of a new high resolution light pen for use in a variety of applications involving CRT's.

According to the makers, the light pen is a cost-effective means of



MAKES DATA ENTRIES

making data entry to menu-driven software programs working in conjunction with, or entirely independent of, keyboard entry.

Graphics, CAD/CAM, education, medical and industrial design are a few of the applications into which this light pen can be designed.

The DT170M's unique optical design features high resolution over a wide range of screen intensities. In addition, it features a fast response time (less than 250 nanoseconds), high noise immunity, and the industry-standard push tip. The light pen works with black and white or color CRT's, and comes standard with a nine-foot coil cord and modular connector. *Design Technology, San Diego, CA.*

Write No. 334 on Inquiry Card

Scannable Rating Labels

PDE Associates has announced the development of scannable rating labels used for test scoring when more than one evaluator needs to rate a composition or similar test.

PDE Associates claim the process will speed scoring, eliminate the cost of manual key punch, reduce paper volume, assure unbiased ratings and improve the accuracy of data.

The process now allows several different evaluators to use the same scannable scoring sheet while maintaining confidentiality. The system is designed to be used with existing optical scanners. *PDE Associates, Tampa, FL.*

Write No. 316 on Inquiry Card

Tape System for Apple Computers

Advanced Digital Information Co., has announced a large capacity cartridge tape system for the Apple computer family called the Data Library.

The Data Library features a removable cartridge that is block addressable. Each cartridge is preformatted to allow random data access. Data access time for large files are similar to standard disk drives.

Software is included with the Data Library to organize files under DOS 3.3 in the same manner as a hard disk. Each formatted cartridge contains 170 volumes, with 48 tracks, with each track having 32 sectors and each sector having 256 bytes; each removable cartridge has effective storage equal to 515 standard Apple DOS 3.3 diskettes.

The interface card, which utilizes one slot of the Apple computer, has a RAM buffer of instant directory and file access. The buffer memory can be expanded from 64 kilobytes to one megabyte allowing it to function as a RAM disk. *Advanced Digital Information Corp., Kirkland, WA.*

Write No. 302 on Inquiry Card



Now Control Data introduces SAM. Because student aid doesn't stop for homecoming, finals or spring break.

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sional skills in the most productive manner possible. It gives you better control of your financial aid process.

SAM runs on Control Data CYBER computer systems. That's important because you get the aid management solutions you need while students and faculty get the academic computing facilities they need. All in one system.

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You can find out more about SAM application modules, and how their capabilities can cost-effectively be combined with educational computing. Call your local Control Data sales office, or write: Control Data Corporation
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Write No. 116 on Inquiry Card

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Write No. 75 on Inquiry Card

Products (continued)

Model 5248 Desktop Copier

The Model 5248 desktop copier from Media Systems Technology automatically copies, verifies and sorts diskettes. The 5248 is a stand-alone 5-1/4" tpi system that supports single and/or double sided diskettes, single and/or double density. Automatic two-level sorting distributes accepted and rejected diskettes into separate bins, saving the user labor and time. The 5248 may also be used to format only, or to verify only.

The 5248 can be reconfigured to support different formats, according to the makers. The copier includes all automatic loading/unloading features, a master diskette drive, a copying diskette drive, a removable dual-bin output stacker and a lighted control panel. *Media Systems Technology, Inc., Irvine, CA.* Write No. 361 on Inquiry Card

IBM PC Transformed with 'Edu-Mod'

"Edu-Mod," a backpack designed to add interactive training and education capabilities to the IBM PC has been developed by Bell & Howell Co.

The Edu-Mod accessory has three independent audio jacks with volume controls for connecting various training and education peripherals to a single audio output source for the student. Also included are two video outputs to simplify the connecting of one video screen for the instructor and one for the audience.

Besides eliminating the potential need for separate power strips or wall sockets, these three 110-VAC outlets can be used to switch on many PC multi-component systems. This feature minimizes the number of cords connecting from the computer system to wall power sockets. *Bell & Howell Co., Chicago, IL.*

Write No. 320 on Inquiry Card

System Control Surge Sentry

RKS Industries recently introduced the System-Control Surge Sentry Model SS-120-SC. It is designed with a five-receptable special socket. It has automatic power-on, providing up to five pico-second response to high voltage



SS-120-SC SURGE SENTRY

transients, protecting up to five sensitive electronic devices.

The Surge Sentry also features a sensor in one receptable which, when current flow is detected, automatically supplies power to the remaining receptacles.

It operates in parallel with the power line and is not load-bearing, so downline equipment continues to operate unharmed should the unit cease to function. A neon monitor light remains lit only when the device is operating to full specifications. *RKS Industries, Scotts Valley, CA.*

Write No. 367 on Inquiry Card

Large Screen Projection Display

Vector General Inc., has introduced a large screen projection display for use with its System 8000, as well as with its other product lines, the VG 8250 and VG 3300 graphic display systems.

The projection display has been developed for use in design reviews, presentations, training, and other applications where many users want to view the same image. The large screen display operates off the same data base and generates the same

picture as a VGB 8250 single-viewer display station.

The VG projection display projects an image that is generated, through a series of lenses, from a high-intensity monitor onto a screen as large as six feet by six feet with a 1,000-line resolution either front- or rear-projected.

The projection display system includes a function switchbox, an alphanumeric keyboard, and a data tablet. The tablet allows operators or training personnel to manipulate the image in the same manner they would on a conventional VG 8250 display station. *Vector General, Woodland Hills, CA.*

Write No. 335 on Inquiry Card

Family of Low-Cost Robots

Spectron Instrument has introduced the first of a family of low-cost robots. They are intended to introduce the experimenter, educator or inventor to robots and robotic vision. Wood and hobby grade materials are used. The systems are offered primarily as kits.

They can be used for demonstrations, student projects and "proof of concept" experiments. The systems can be upgraded for more advanced work.

The first unit is the Robot I, 2 axis articulated robot arm. The arm moves — under computer control — over the working table and can pick up game markers with an electro-magnet or draw with colored pens. It introduces the user to interface hardware, programming — done in BASIC or other languages — and the coordinate transformations required by most robots. The model can also be used to simulate more general "pick and place" and material handling applications.

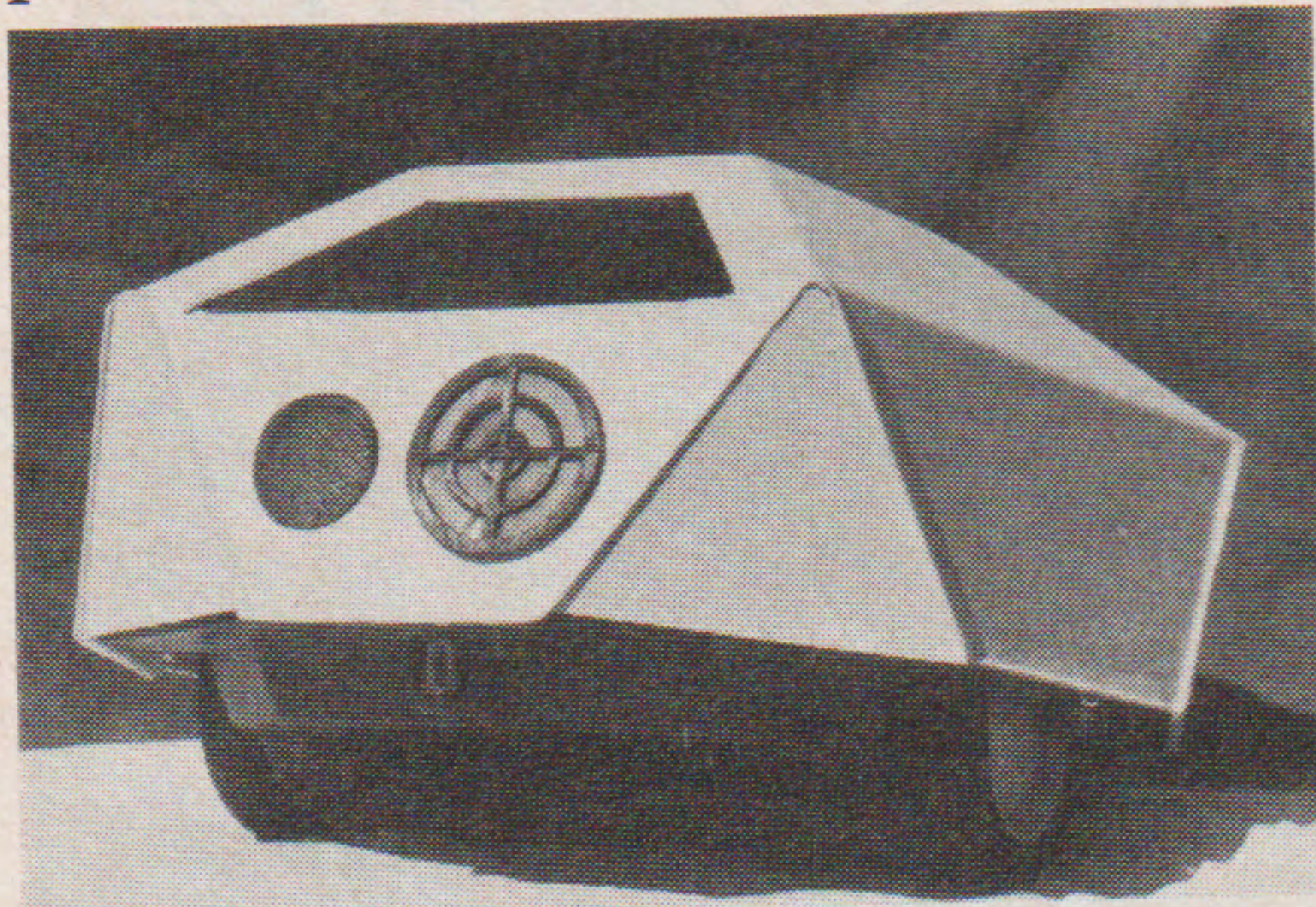
A vision add-on module allows experiments with object recognition, parts inspection, tracking, automatic positioning and maze solving. A wide range of robot vision techniques can be implemented in

BASIC language and tested at modest speed. *Spectron Instrument Corp., Denver, CO.*

Write No. 333 on Inquiry Card

Personal Robot Uses Z-80 Processor

"Ropet" is a personal robot that does not require an external computer. Its built-in computer controls



NO EXTERNAL COMPUTER NEEDED

mobility and provides collision avoidance, and has the ability to obey spoken commands, for both

speech and complex sound generation.

Use of the industry-standard Z-80 processor, standard S-100 bus, and modular construction allow expansion and customizing of functions, as well as encouraging hobbyists and programmers to personalize Ropet for their specific applications.

Plug-in cartridges transform Ropet to: a guardian, an entertainer, a promoter, a therapist, an educator or a developer. *Personal Robotics Corp., San Jose, CA.*

Write No. 343 on Inquiry Card

V/CDS System and Interface Card

An English-based video courseware development system—V/CDS—has been released by the Bell & Howell Company's Interactive Communications Division. The division is also offering a video cas-

(continued on page 172)

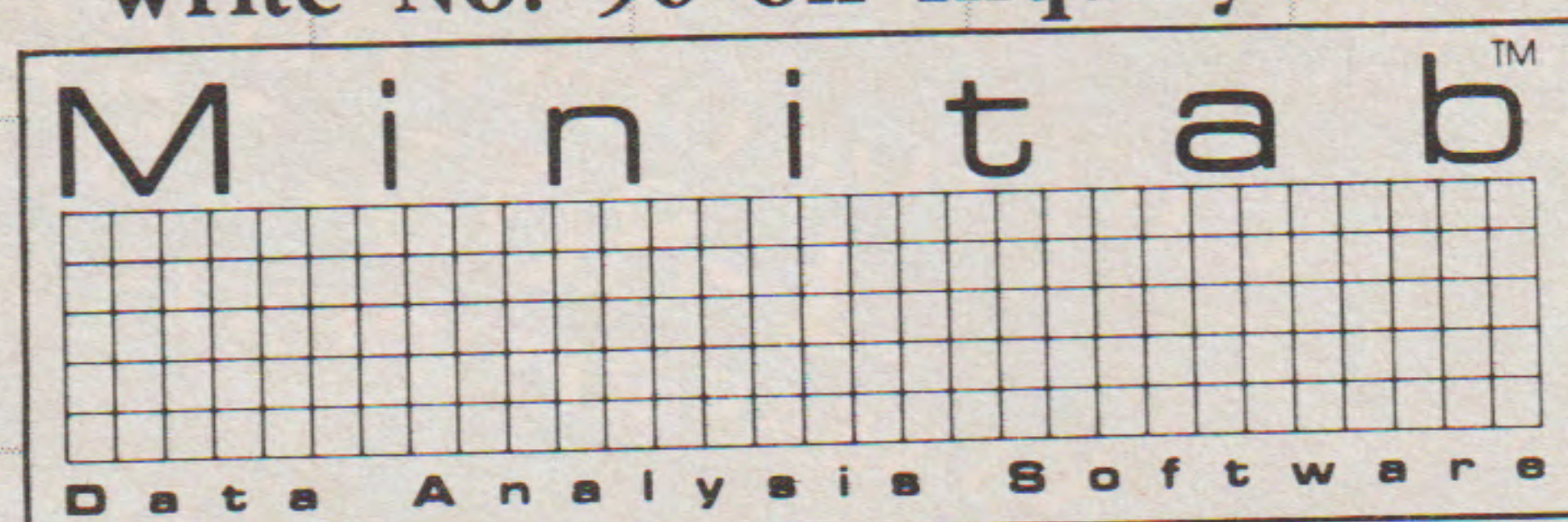
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- Greater emphasis on statistical analysis. Students learn when to perform a statistical procedure, not just how.

Products (continued)

sette recorder (VCR) interface card that allows a trainer to link a microcomputer to a video cassette recorder.

The V/CDS system is a microcomputer-based lesson development system which operates totally in English. The system prompts the lesson's author for the information it needs to create and present the lesson.

Used with the VCR interface card, the V/CDS system is designed to utilize existing or specially created video materials, and integrate those materials into the lesson to make it more effective.

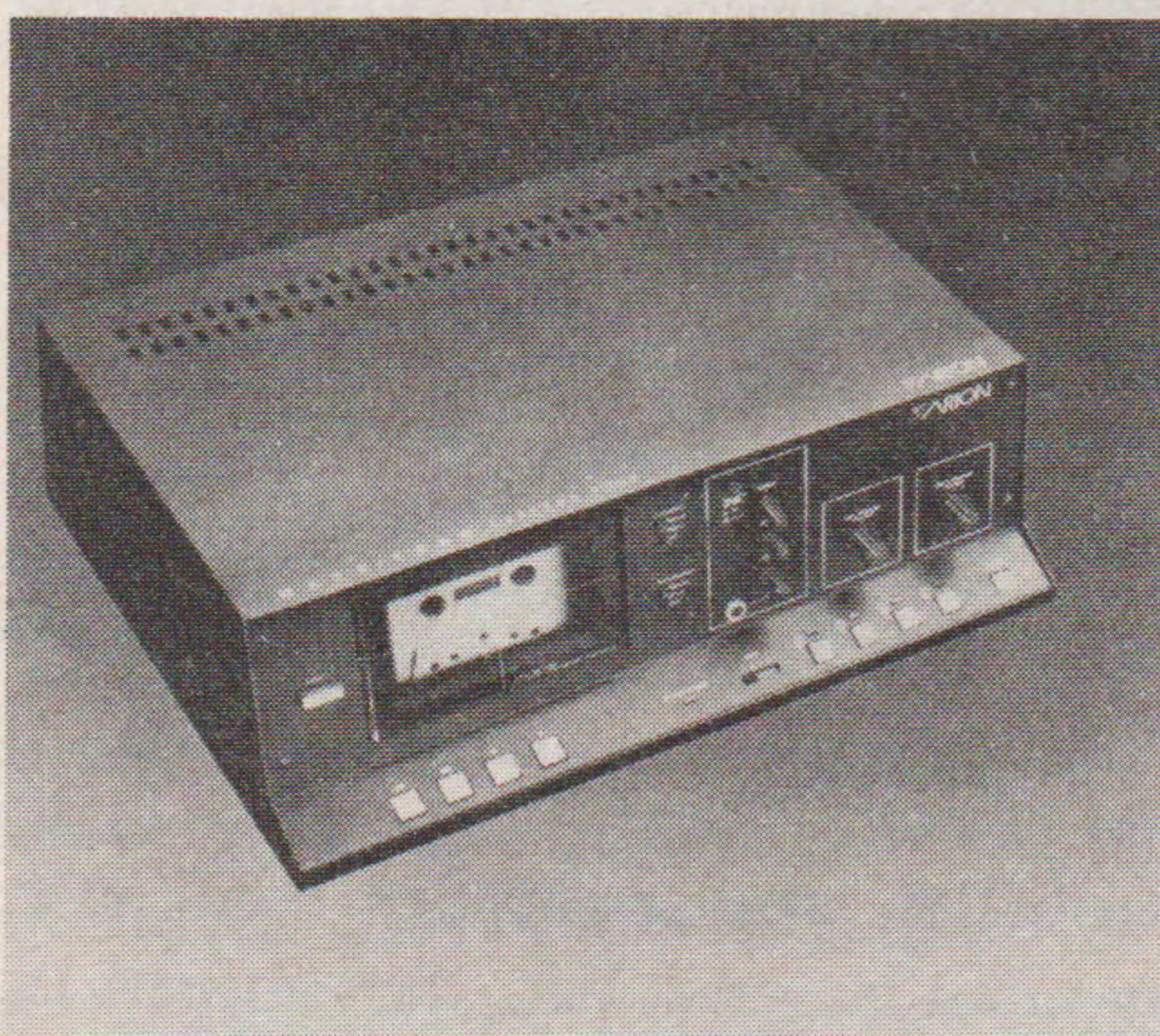
The V/CDS system and the interface card are compatible with the Apple II or Apple IIe microcomputer. The interface card is compatible with Sony SLO-320, 323 or

Panasonic NV-8200 video tape recorder. *Bell & Howell Co., Chicago, IL.*

Write No. 329 on Inquiry Card

Four Projector Presentation System

The Express Four, recently released by Arion Corp., is the only portable four-projector presentation system with integrated, professional



MATE-TRAC EXPRESS FOUR

quality stereo sound, according to the makers.

Arion combines Four Plus dissolve control with advanced audio components to provide a presentation system for controlling up to four projector slide shows.

The Express Four is designed for simple operation and fast set-up. One touch activates both the projectors and the stereo. When the slide presentation is finished, the Express Four automatically rewinds the tape, and shuts off projector power. The Express Four also is designed for continuous playing; one touch is all that is needed to run a slide presentation all day, without an operator.

It can expand to up to 16 projectors and 12 auxiliary devices with the addition of Arion Four Plus, Two Plus Kodak or 3M dissolve controls. *Arion Corp., Delano, MN.*
Write No. 344 on Inquiry Card

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Write No. 74 on Inquiry Card

'Autodisc' Drives a Videodisk Player

Whitney Educational Services of San Mateo recently announced a new product which could extend the use of laserdisk technology in education and information storage.

The product, dubbed the "Autodisc," uses a standard audiocassette tape to drive a videodisk player in much the same way a slide/sound show controls a slide projector. It uses the videodisk as an "electronic slide tray" to provide not only still pictures but motion segments as well, all synchronized with the audio tape.

The Autodisc records a special digital signal on one track of the tape while the other track is used for narration. On playback the videodisk player responds exactly as it did during the initial recording with single frames or motion sequences accessed immediately from any part of the disk. The Autodisc can stop motion, search, play forward or reverse or access specific frames.

With the Autodisc, hundreds of

different presentations can be prepared using the same videodisk as a source of material. Each presentation can be stored and distributed on an inexpensive cassette tape. *Whitney Educational Services, San Mateo, CA.*

Write No. 336 on Inquiry Card

Printer Capability for IBM PC, Lotus

Dataproducts S.P.G. recently announced the availability of a printer capability for IBM PC and Lotus 1-2-3 applications.

Using the company's P-80 and P-132 dot matrix printers, IBM PC and Lotus 1-2-3 users can now get color and graphics output, at speeds up to 200 cps, in one output device.

The P-80 and P-132 printers are modular, field upgradeable dot matrix devices that are fully compatible with the IBM PC. They feature a graphics capability that enables users to print out any kind of graphic developed using the PC or Lotus 1-2-3. Bar, pie and scatter charts, and graphs are output on the P-80 and P-132 printers in a 84-by-84 dpi format.

Text, charts and graphs can also be produced in color, enabling PC users to: display the ups and downs of complex data; point out changes; show trends, or highlight important information. *Integral Data Systems, Inc., Millford, NH.*

Write No. 337 on Inquiry Card

Indexing Kit for Micro Auto 16

Minolta Corporation/Micrographics Division recently introduced MINK — Minolta Indexing Kit.

The indexing kit, designed specifically for Minolta's Micro Auto 16 and Micro Auto Dual 16 Planetary Recorders, consists of three independent but related elements: Blip Copyboard; Tri-Level Blip Pack, and Image Numbering Unit.

The black Blip Copyboard assures high quality micro images, with a standard-size blip automatically recorded under each micro image. Because the blip is on the copyboard itself, there is no risk of faulty indexing.

For more sophisticated retrieval requirements, the Tri-Level Blip Pack adds a further indexing dimension with up to three retrieval parameters. The Image Numbering Unit consists of a simple push-button controller with a four-digit module in the copyboard. This generates sequential frame numbers in between micro images on the film. *Minolta Corp., Ramsey, NJ.*

Write No. 307 on Inquiry Card

VDISK - Produces 5-1/4" Disk Format

Software distributors can now produce practically every 5-1/4" disk format on an unmodified IBM PC by

using VDISK, a new software from CompuView Products, Inc.

The VDISK software package includes (and requires) CompuView's advanced CP/M-86 operating system and utilities.

The new product is being marketed to developers and distributors who want their software running on many different types of hardware, but don't want to invest in the extensive machinery, which up to now, has been necessary.

A menu-driven utility, VDISK reads/writes and formats diskettes for many PCs, including DEC Rainbow, Kaypro, Osborne, Otrona, Morrow, NEC PC 8000, Televideo TS-802, Eagle II, IBM CP/M-86, Digital Research Concurrent CP/M-86, Superbrain, NCR, Texas Instruments' Professional Computer and many others. *CompuView Products, Inc., Ann Arbor, MI.*

Write No. 324 on Inquiry Card

(continued on page 174)

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Products (continued)

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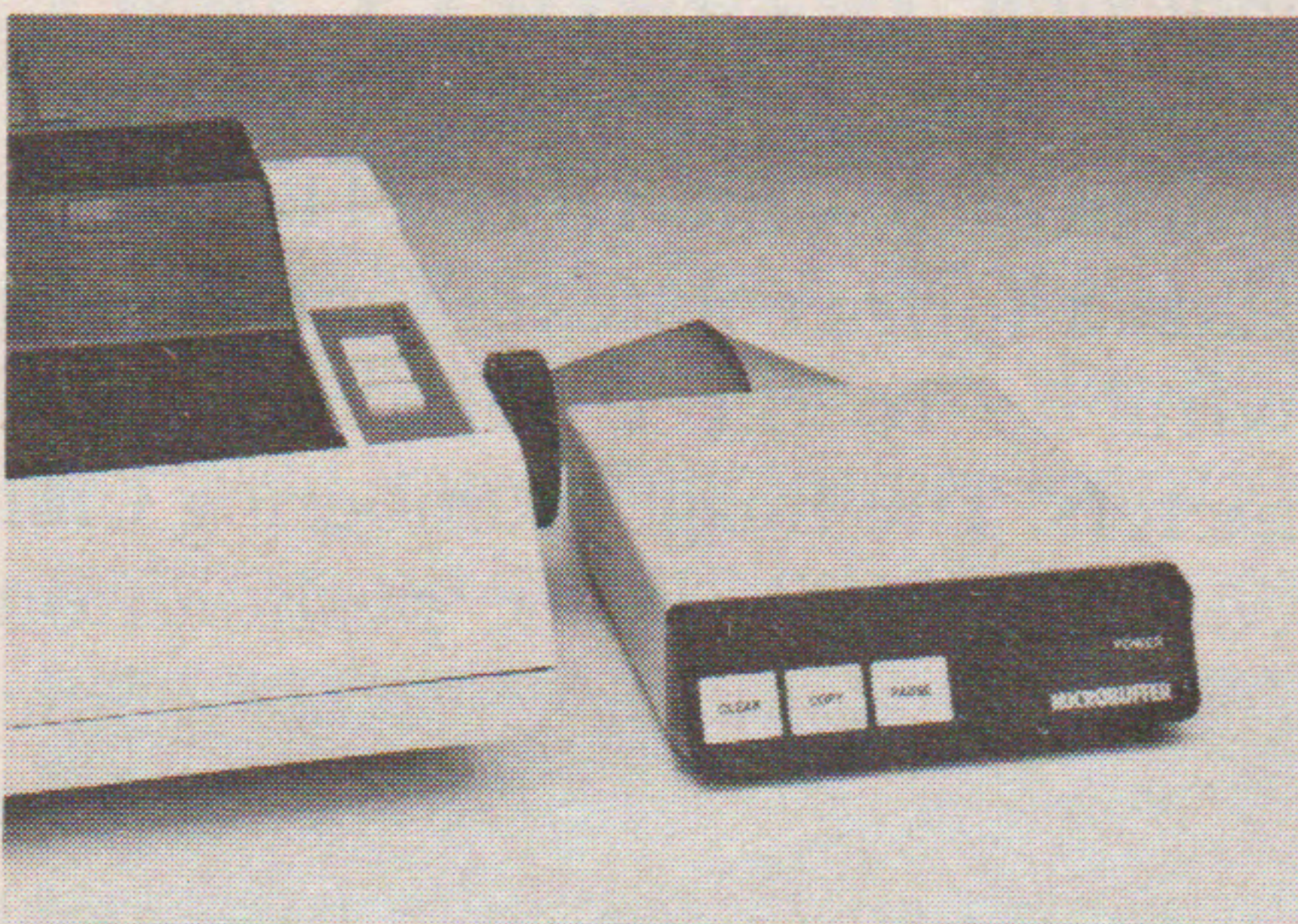
Brown Disc Manufacturing, Inc., recently introduced the Pulse line of universal disks to fit more than 650 computer drive applications.

The universal products are intended to reduce retailer stock and lessen consumer confusion. The universal disk designated as Pulse I is designed to fit all soft-sectored, single and double-sided drive applications with up to 48 tracks per inch, single or double density.

Pulse II will fit all soft-sectored, single or double-sided drive applications having a single or double density and between 48 and 96 tracks per inch and up to one megabyte. *Brown Disc Manufacturing, Inc., Colorado Springs, CO.* Write No. 351 on Inquiry Card

Stand-Alone Printer Buffer

A stand-alone printer buffer allows microcomputer users to print and process data simultaneously. Called



MICROBUFFER - 19.2 BAUD RATE

the Microbuffer, the device improves productivity by eliminating the wait for computer entry time while files are printing.

Printer-intended data is received by the microbuffer at up to 19.2 baud rate and stored in the device's memory buffer, freeing the computer for processing. The data is then

released from the microbuffer to the printer at the proper rate.

Virtually any computer, including IBM, Apple, TRS-80, Osborne, and NEC, and any printer, including Epson, NEC, Diablo, C. Itoh, and Okidata, will work with the microbuffer. The device also can be used with almost any computer/modem combination.

The microbuffer is available in either a serial or parallel interface version with 32 Kb or 64 Kb memory, expandable to 256 Kb. The parallel version (Centronics-compatible) comes equipped with its own six-foot cable; the serial version requires Inmac cable 310-2. *Inmac, Santa Clara, CA.*

Write No. 322 on Inquiry Card

Apple-Compatible Joystick Controller

W.T.I. has released the Half Track professional joystick, a controller that is completely Apple-compatible. It is self-centering with an adjustable height joystick.

The Half Track joystick features a metal enclosure for durability and weight stability, dual left and right push buttons, utilizing micro switches for games activation of functions, and adjustable joystick height for sensitivity and comfort.

Also featured are dual trim tabs for fine horizontal and vertical centering and potentiometer self-centering type control for horizontal and vertical coordination. *Wholesale Technology, Inc., Anaheim, CA.*

Write No. 352 on Inquiry Card

Cartridge Designed to Teach Languages

The Promqueen/64 microprocessor development cartridge, specifically designed for the 64 Kb memory of the Commodore 64 microcomputer, is now available from Gloucester Computer, Inc.

The Promqueen/64 is a microprocessor development system that helps teach computer fundamentals

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Write No. 100 on Inquiry Card

and also provides a convenient means for preparing and storing machine language programs in reliable, tamper-resistant plug-in cartridge form.

Like the original Promqueen system introduced for Commodore's VIC 20 microcomputer, the Promqueen/64 may be applied at elementary, secondary, and college levels, as well as in specialized vocational and industry-related computer training programs.

The low-cost Promqueen/64 features universal editing software-Autohex/64 supplied on an EPROM (erasable programmable read-only memory). It uses the Commodore 64 microcomputer for keyboard input and CRT display. *Gloucester Computers, Inc. Gloucester, MA.*
Write No. 356 on Inquiry Card

Voice Recognition for Microcomputers

Voice Machine Communications, Inc., (VMC) has released the first of its voice recognition products for microcomputers. Currently available for Apple II-type computers, including the Apple IIe, VMC's Voice Input Module (VIM) provides keyboardless operation of commercially available software, such as VisiCorp's VisiCalc, with 98+ percent voice recognition accuracy, according to VMC spokesmen.

To meet diverse needs with a single board, the VIM is designed for flexibility and ease of use with a combination of special purpose hardware and software. Included with each VIM is the VMC2020 circuit board, microphone assembly, connection cables, user's manual and menu-driven voice utility software.

Hardware processing of speech input is accomplished by a 16-

channel audio spectrum analyzer controlled by a 68B03 microprocessor running firmware resident in an onboard 4 Kb EPROM. Users' voice patterns and their associated keyboard replacement characters are stored in 8 Kb of random-access memory. *Voice Machine Communications, Inc., Santa Ana, CA.*
Write No. 353 on Inquiry Card

Terminal Emulates Hazeltine, DEC Units

A new dual mode terminal that emulates both Hazeltine 1500 series and DEC VT100 series units has been announced by Teleray, a division of Research Incorporated.

The Model 100/1500 was designed to operate in both DEC and Hazeltine environments, and is designed to replace Hazeltines in situations where a change to ANSI controls is contemplated.

In ANSI mode, the 100/1500 emulates the VT100 series (with advanced video option) in every respect except VT52 compatibility. This includes a 132-column by 24-line display, block transmission, and a bi-directional RS232 peripheral port.

It also has a 256-character input buffer, four smooth scroll rates, double height, double width characters, screen saver, monitor mode, and an 880-character nonvolatile function memory that offers 20 keyboard-programmable functions on dedicated keys.

In Hazeltine mode, the 100/1500 employs the same control codes and escape sequences as the 1500, 1510 and 1520 terminals (and certain of the 2000 series), and operates in both character and format (block) modes. Selection of 1500 series operating features is made from the keyboard in set-up mode, rather than by dip-switches that

(continued on page 176)

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Includes: "Audio Enhancer" computer/cassette interface, earphones, microphone, **Spell-It!** diskettes, documentation, demo lesson, and free cassette tutorial.

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Features: automatic scoring, report generation, and optional random question sequencing. *Includes:* Program diskette and back-up, documentation, and free cassette tutorial.

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All software requires Apple* II+ or IIe and one disk drive. All prices include shipping. MD residents add 5% sales tax. Send check, money order, or purchase order to:

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Write No. 89 on Inquiry Card

Products (continued)

are characteristic of Hazeltine terminals. *Research Incorporated, Minneapolis, MN.*

Write No. 354 on Inquiry Card

Micro-Professor-I Upgraded to MPF-IP

Multitech Electronics, Inc., recently announced an upgraded version of its Micro-Professor-I. The new upgrade, called MPF-IP, features more extensive software support, more built-in memory, an improved keyboard and a larger display. The MPF-IP, which includes several self-teaching instruction manuals, is a training tool for all levels—from beginners to advanced engineers who want to upgrade their microcomputer skills.

At the heart of the MPF-IP is a Z80 microprocessor. An 8-Kb mon-

itor ROM also supports the functions of the text editor, two-pass assembler and line assembler. *Multitech Electronics, Inc., Sunnyvale, CA.*

Write No. 355 on Inquiry Card

Cleaning Packages for Type Elements

Innovative Computer Products recently introduced two PerfectData type element cleaning kits. One is designed to clean daisywheel print elements used in most of today's computer printers and intelligent typewriters. A second kit has been designed for electronic typewriters with print elements compatible with the IBM Selectric-type ball.

The kit consists of the proprietary cleaning unit, a cleaning pad, and one bottle of cleaning solution. Each kit provides enough solution for approximately 25 cleanings. New

pads and solution can be purchased as needed. *PerfectData Corp., Chatsworth, CA.*

Write No. 362 on Inquiry Card

HR-25 — Letter Quality Printer

The Brother HR-25 is a high speed, letter quality printer introduced by Dynax, Inc.

Big brother to the HR-1, which was introduced in early spring, the HR-25 is the fastest printer in its price range on the market, according to Dynax. It prints 23 cps.

The HR-25 is a high performance daisywheel printer with such standard features as: proportional spacing; auto space underlining; super/subscript; bold printing; copy feature; character pitch selection; line pitch selection; auto strike out; memory clear, and Top of Form feature. It provides two-color printing on a cassette-type print wheel.

The HR-25 is designed for small business, educational institutions and the home user who requires letter quality printing. *Dynax, Inc., Bell, CA.*

Write No. 303 on Inquiry Card

Four-Function IBM-PC Board

MBI Corp., recently announced distribution of the Monte Carlo Quarto board. The "Quarto" is a lower-cost version of MBI's popular Monte Carlo IBM PC peripheral. This four-function board retains all of the features of the standard Monte Carlo board, with the exception of the joystick ports, which are not necessary for many applications.

MBI was designed for the many end users who need the versatility of a multifunction board without joystick capability. The versatility of the card, combined with the lower price, should have appeal for users looking for a multifunction IBM PC add-in. *Microcomputer Business Industries Corp., Golden, CO.*

Write No. 368 on Inquiry Card

VERSATILE DATA REDUCTION, DISPLAY AND PLOTTING SOFTWARE FOR YOUR APPLE* II

STRIPCHARTER — Turns your APPLE and Epson MX series printer into an economical 4-pen chart recorder. Prints and displays continuous 1 to 4-channel strip-charts of any length. Ideal for large data sets. Numerous user-selectable graphics options enhance output quality. Includes 5 demos on disk with 37-page manual **\$100**

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SCIENTIFIC PLOTTER — Draws professional-looking graphs of your data. You choose data format, length and position of axes, 20 symbols, error bars, labels anywhere in 4 orientations. Includes 5 demos on disk plus 30-page manual **\$25**

(For DIF file and Houston Instrument or H-P 7470A plotter adaptations, add \$25 for each option selected.)

CURVE FITTER — Select the best curve to fit your data. Scale, transform, average, smooth, interpolate (3 types), LEAST SQUARES fit (3 types). Evaluate unknowns from fitted curve. Includes 5 demos on disk with 33-page manual **\$35**

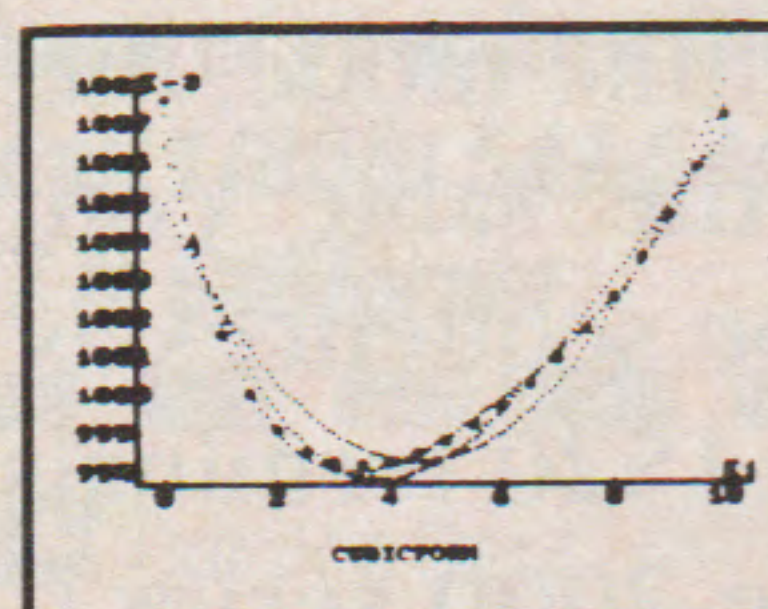
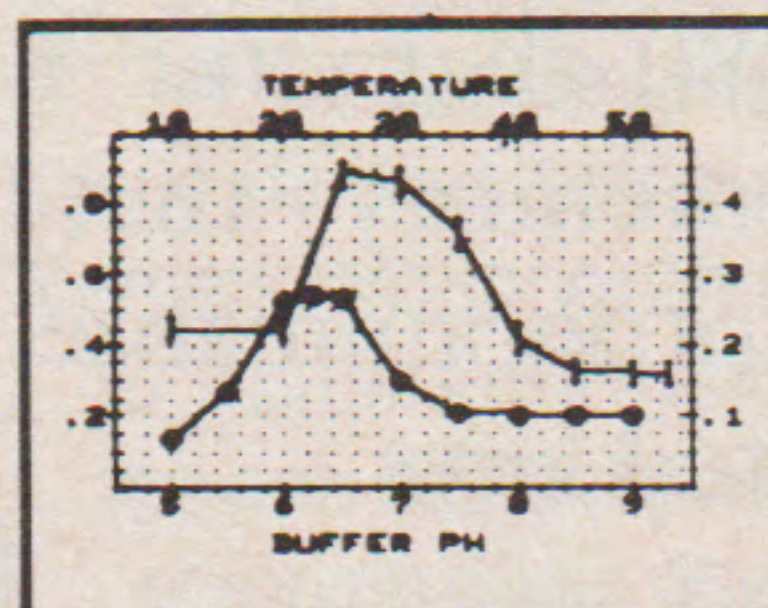
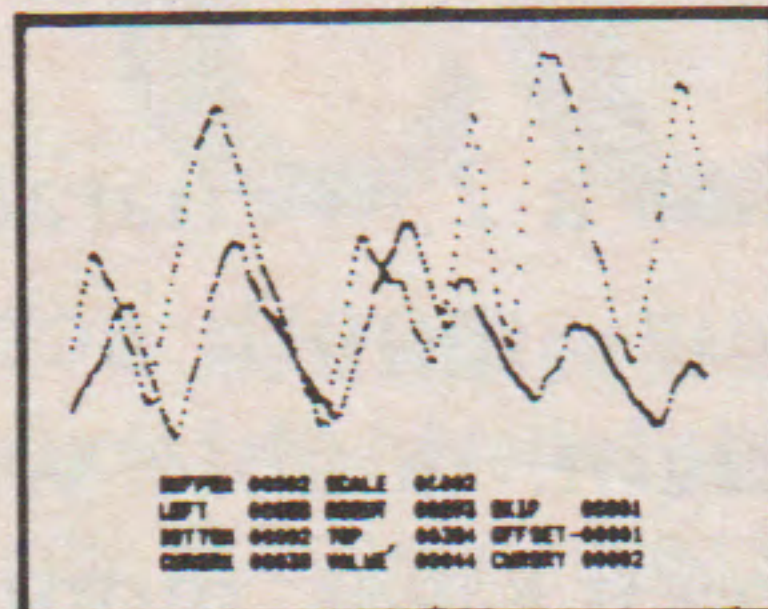
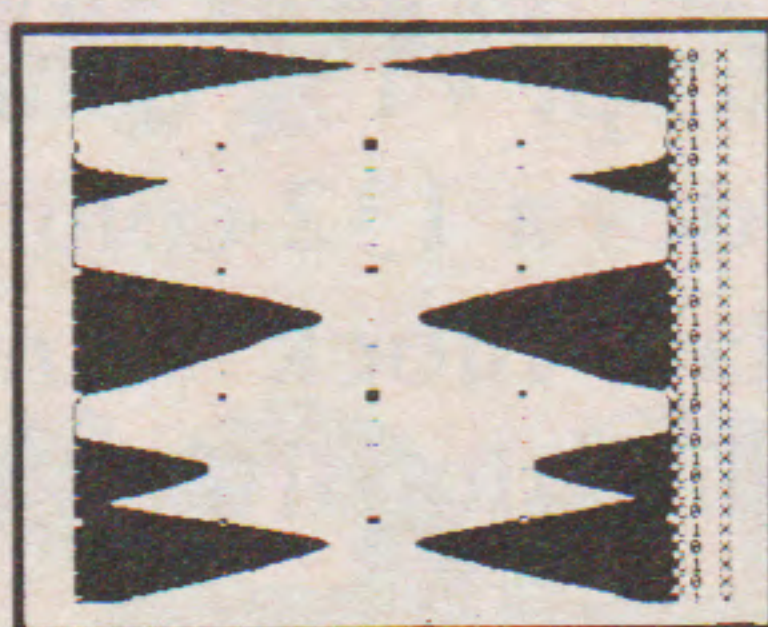
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Write No. 106 on Inquiry Card

Hard Disk Controller

A hard disk interface/controller that results in economical expansion of the storage capacity of IBM Personal Computers was introduced recently by Mountain Computer, Inc.

The new Mountain Hard Disk Controller permits IBM PC users to upgrade to XT capability at less than half the price of an IBM expansion chassis. In addition, it enables current XT users to add extra disk drives to their systems at a price below that of IBM.

The Mountain controller is the first available from a manufacturer other than IBM to offer full compatibility with the IBM PC run under MS/DOS 2.0, according to the makers. In addition to being less expensive than the comparable IBM controller, the Mountain board results in faster throughput due to its sector cache and buffer with an intelligent read-ahead algorithm.

Coupled with Mountain's Space Saver half-high disk system, the controller enables users to add a full five megabytes of hard disk storage to the IBM PC. *Mountain Computer, Inc., Scotts Valley, CA.*
Write No. 357 on Inquiry Card

Multi-Outlet Surge Protectors

An expanded family of multi-outlet surge protectors provide users with a power center that protects equipment against surges, spikes, and hot wires, according to the makers. The devices also allow numerous cords in the same surge protector outlets, which provides customer control via a single switch, and permits easy reset after an overload situation.

The protectors filter out AC line noise that can distort stored data and cause program propagation errors. These multi-outlet power centers are available in one, two, four, six, and eight outlet capacities.

Available through Inmac, the outlet models feature an automatic

termination in the event of an overload, as well as a 15-amp press-to-reset circuit breaker. An on-off switch has a light which indicates when the unit is on. Each unit also comes with "U" ground receptacles for maximum safety, and a six-foot grounded power supply cord. *Inmac, Santa Clara, CA.*

Write No. 363 on Inquiry Card

Trendcom Line of Portable Computers

3M is offering a new line of portable printers — the Trendcom Models 150, 151, 250 and 251 thermal printers.

The printers are offered in two sizes. Models 150 and 151 employ a 4-1/2" carriage for 40-column printing and 80-column compressed printing. The Models 250 and 251 have an 8-1/4" carriage that accommodates 80-column applications and 136-column compressed printing.

All four versions are equipped with a 2,048-character buffer. The thick-film thermal printhead has a life expectancy of 50 million characters. Two DC stepping motors provide control of the printer's only moving parts, the printhead and paper drive. *3M, Sunnyvale, CA.*

Write No. 325 on Inquiry Card

Computer Carrel

Marvel Metal Products Co., has added a new product to its Electronic Environment line of computer support furniture. The Desk Top Computer Carrel is designed to convert any computer workstation that is 48 inches wide, or wider, to a semi-private office.

The all-steel unit frees the work surface by providing overhead storage. It also assures a measure of privacy.

The carrel is available in sizes to fit 48" or 60" work surfaces. A full-width 11" shelf adjusts in four stages from 15 inches to 21 1/2 inches high, providing clearance above the CRT

unit. Steel book supports which grip shelf edges are also included.

The paper storage tray has two compartments and can slide to any position under the shelf. The carrel attaches to any work surface with pressure sensitive adhesive under the side panels. *Marvel Metal Products Co., Chicago, IL.*

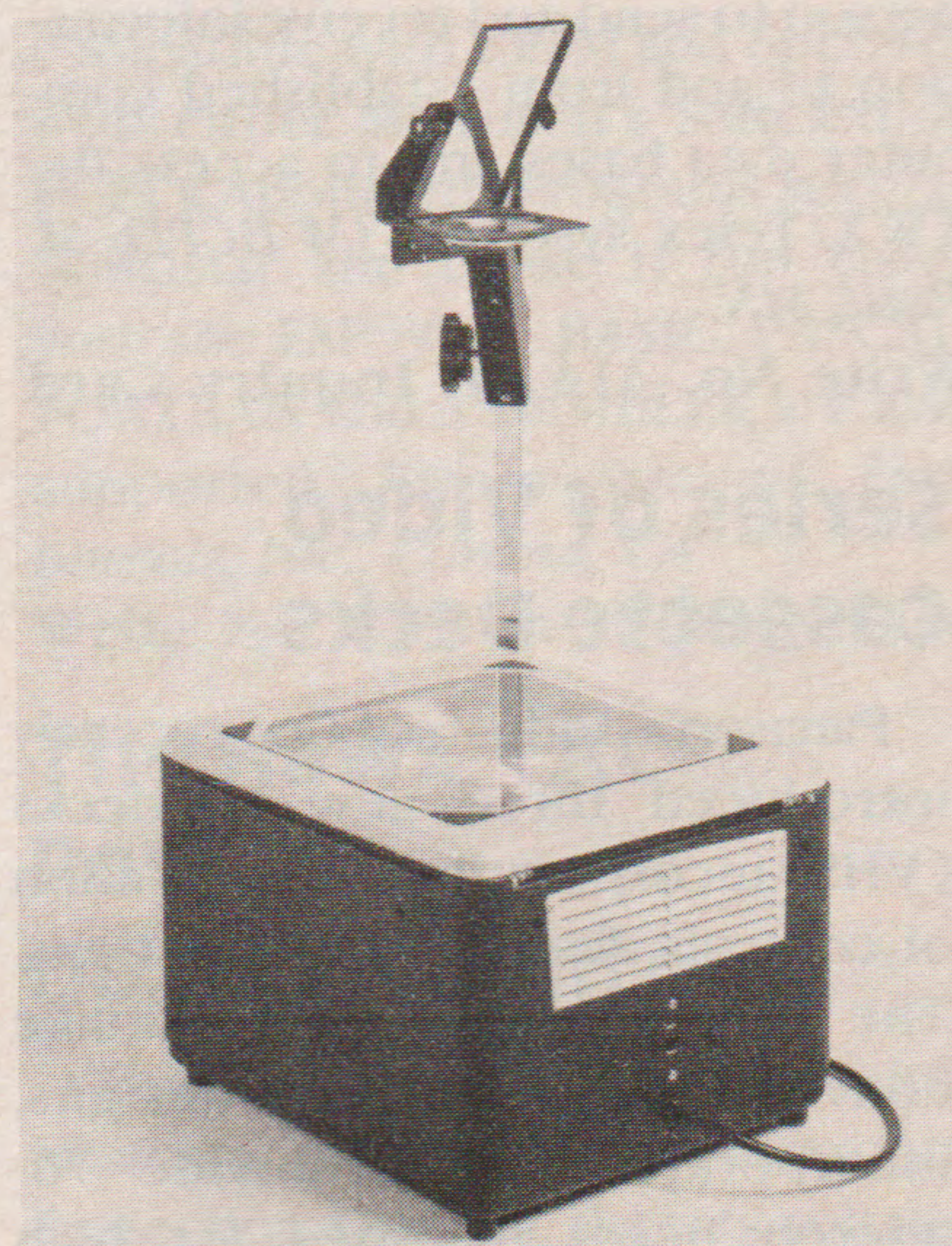
Write No. 304 on Inquiry Card

Overhead Projector

The G-100-JX, a portable overhead projector, is available from the Charles Beseler Co.

The new projector offers sturdy, all-steel construction and many of the features Beseler incorporates into its more expensive overhead projectors, according to the makers.

The 600-watt quartz-halogen lamp produces brilliant screen images while the projection head's single-lens element guarantees sharp, bright pictures at all elevations. With the G-100-JX's tilting projection system, the projection angle can be raised 30 degrees without discoloring or dulling the image. When closed, a visor protects the exposed mirror on the head.



G-100-JX

Standard safety features on the G-100-JX include a safety thermal switch and a safety interlock switch; optional features include an

(continued on page 178)

Products (continued)

acetate roll attachment, a glare shield and a dust cover. *Charles Beseler Co., Florham Park, NJ.*
Write No. 358 on Inquiry Card

Portable Terminal

A portable, electronic terminal designed for use with the 3M Whisper Exchange electronic messaging system — and other electronic mail systems — has been introduced by 3M's Business Communication Products Division.

The Whisper Reader Communications Terminal weighs less than two pounds, measures approximately 10-by-5-by-2-inches, and is fully battery operated. No auxiliary power source is required to send or receive information in print via a standard telephone receiver. Its built-in modem provides transmission through direct connect to RJ-11 telephone jacks or via optional acoustic couplers.

In addition to providing access to electronic messaging systems, the portable Whisper Reader also enables the on-the-road business person to send and receive information to and from established computer data bases and to access the TWX/Telex systems. *3M BCPD, St. Paul, MN.*

Write No. 314 on Inquiry Card

Series of Video Cassette Decks

Panasonic Industrial Co., recently introduced three new ½"-decks (VHS) incorporating a combination of controls, features and functions. The Panasonic AG Series, unlike conventional four-head designs, incorporates two ultra-wide 70-micron heads designed for high resolution during search modes, while two 58-micron heads provide two-hour recording and playback functions.

All three decks have real time counters in hours, minutes and seconds, and auto features for re-

wind, play and repeat. Additional features are mode-lock, two separate audio tracks and Dolby noise reduction.

All three models — AG-6300 and AG-6200 recorders and the AG-6100



PANASONIC AG SERIES

player — use direct drive video head cylinders, full microprocessor logic and aluminum diecast chassis. All units have bi-directional dial search, noiseless slow/still capability and are rack mountable. *Panasonic, Secaucus, NJ.*

Write No. 340 on Inquiry Card

Grafax Spooler for Apple II+ and IIe

The ADS-8211 Grafax Spooler/64 is designed to allow Apple II+ or IIe microcomputers to go on computing — even when data is backed up to the printer. The ADS-8211, designed by Antex Data Systems (ADS), provides an intelligent parallel printer interface with 64 Kb buffer memory and an 8039 microprocessor.

The Grafax spooler board takes the data from the Apple and stores it during printing, thereby freeing the Apple to do other things. The 64 Kb buffer memory equals approximately 20 pages of text.

The ADS-8211 includes a feature that takes a snapshot of the data on the screen and sends it to the printer. It will copy and dump "Hires" graphics screens, as well as text to Ads, C. Itoh, NEC and Epson dot matrix printers.

Included with the GraFax spooler

is six feet of ADS-703 flat cable, with a 36-pin Centronics-type connector. *Antex Data Systems, Mountain View, CA.*

Write No. 315 on Inquiry Card

Disk-Lock Computer Security Device

A computer security device designed to protect microcomputer data from theft and alteration was announced recently by Orange County Technology Associates, Ltd. The product, Disk-Lock, allows an end user to keep his personal disk data unalterable and secret from other users.

Disk-Lock was designed to allow an Apple user to protect any file on disk by entering only the file name and an encoding key. The device plugs into any available I/O slot in an Apple IIe or II+ computer. Disk-Lock scrambles ("encrypts") every byte of any user selected disk file. The heart of Disk-Lock, the Western Digital 2001F encryption processor, allows a user to encrypt or decrypt a 20-sector file on hard disk in about one second. *Orange County Technology Associates, Ltd., Irvine, CA.*

Write No. 339 on Inquiry Card

Terminal Emulates DEC VT102/131

Networx Data Products Company has introduced a new terminal from Esprit Systems, Inc., called the Exec 10/102. This terminal will emulate the DEC VT102/131, has tilt and swivel packaging, a low profile DIN keyboard, 14-inch display, 80/132 columns, and other features in addition to the VT102/132.

Networx also will be introducing a new full-screen editor for VAX users that is terminal independent. This editor will run on any VAX and will allow the user to use low-cost dumb terminals or the new low-cost color terminal or DEC VT series terminals. *Networx Data Products Co., New York, NY.*

Write No. 359 on Inquiry Card

Microcomputer with Mainframe Functions

Cadmus Computer Systems, Inc., recently announced the Cadmus 9000, a super-microcomputer capable of supporting more than 1,000 terminals or 64 graphics workstations

in a distributed UNIX environment using a 50-megabit/second fiber optic link.

The company's proprietary network software, Unison, is claimed to offer transparent access to the total resources of the network to any terminal—in effect providing a

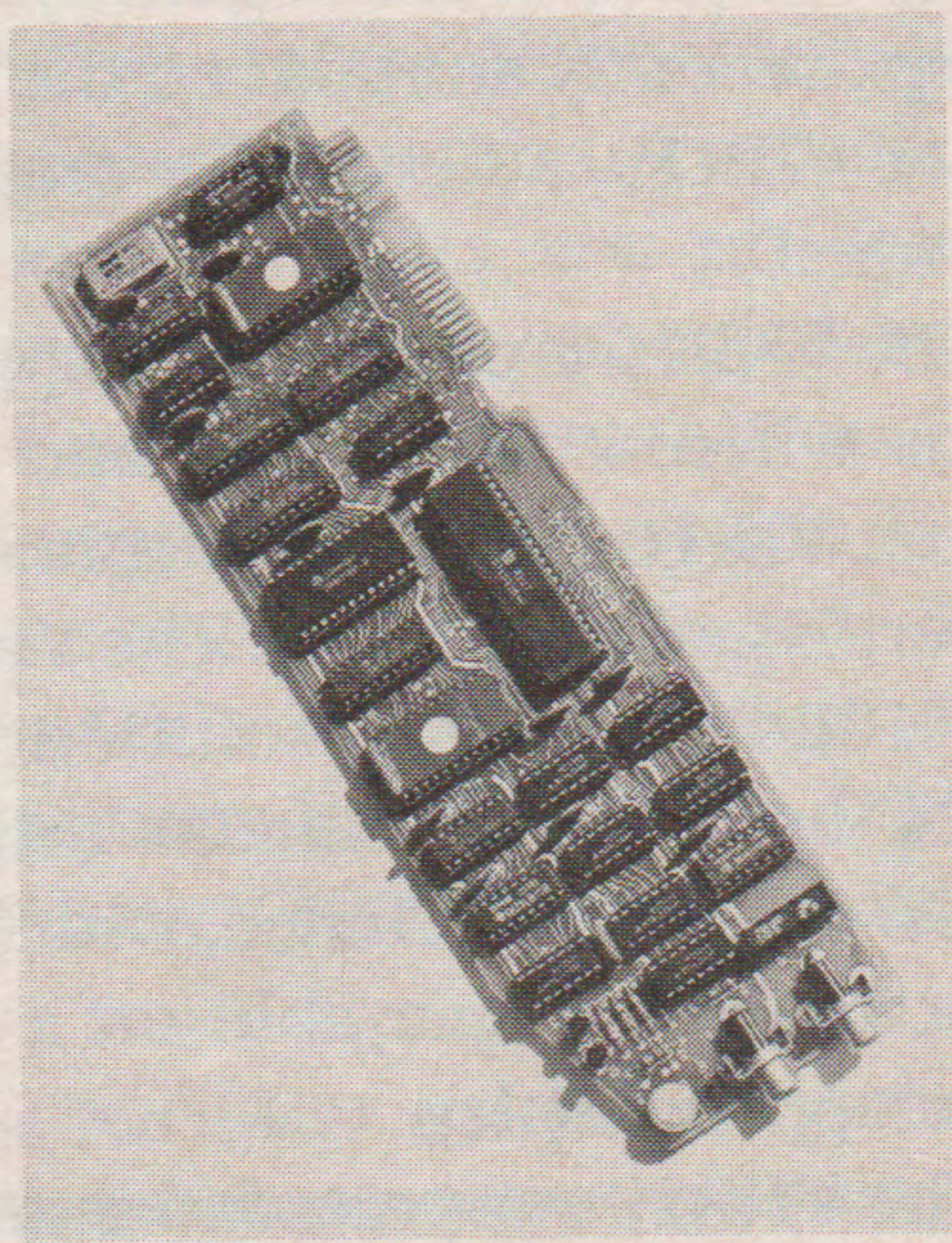
single mainframe environment. *Cadmus Computer Systems, Lowell, MA.*

Write No. 311 on Inquiry Card

Video Display Card

Elcom Systems Peripherals recently introduced a high speed, 80-column video display card.

A half dot shift makes a sharp display possible by giving the card a 7-by-14 effective character cell. The



HIGH-SPEED, 80-COLUMN CARD

entire ASCII upper/lower case character set, including Shift, Shift-Lock and added characters, is supported.

In addition the ESP 8024 is fully compatible with CP/M and operates with either Microsoft's Softcard or PCPI's Applicard. Programs such as Wordstar and dBase II run faster with the ESP 8024. BASIC, PASCAL, FORTRAN and ASSEMBLER are also supported. *Elcom Systems Peripherals, Inc., Corona, CA.*

Write No. 313 on Inquiry Card

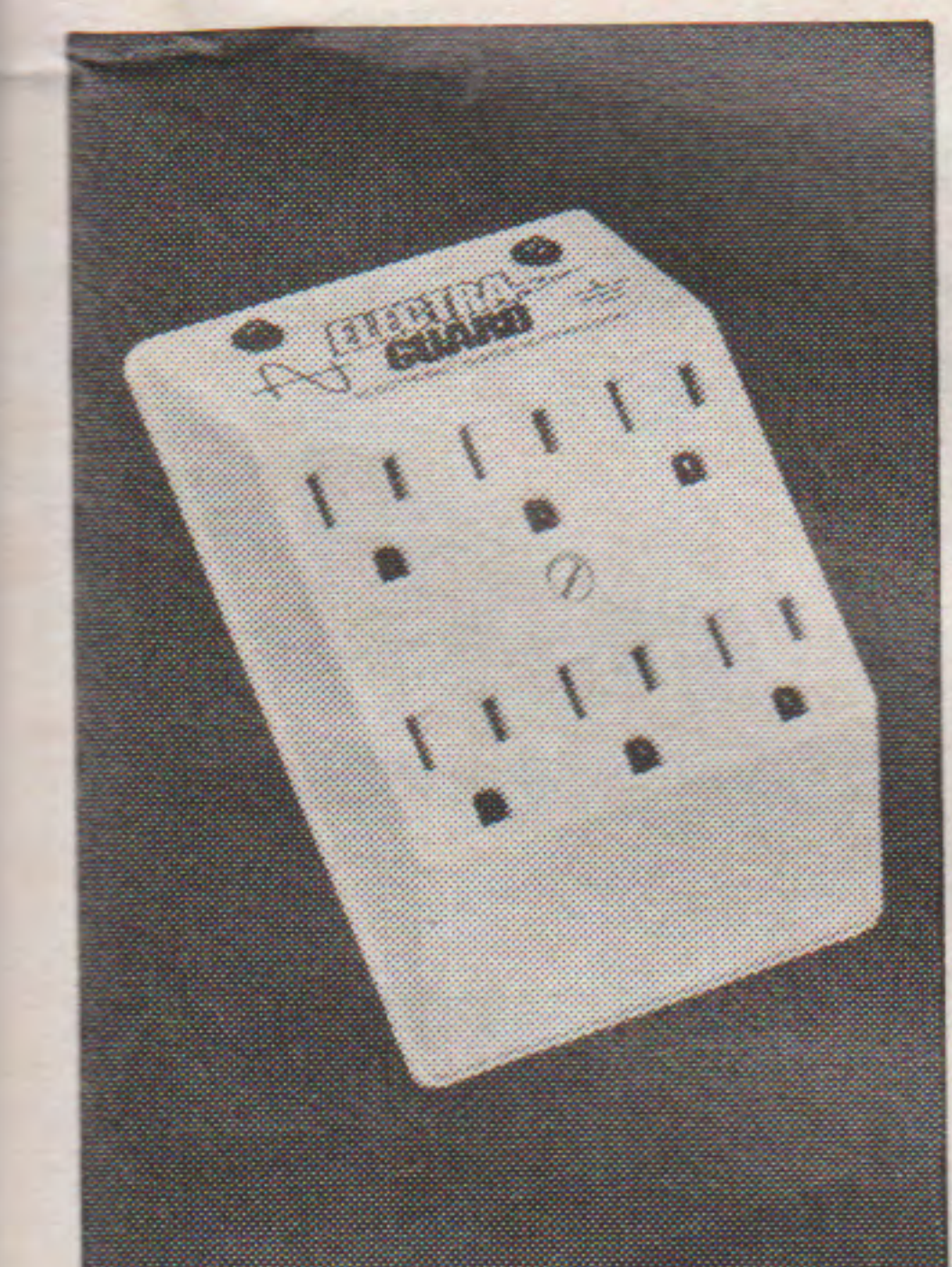
The Hawk - AC Power Quality Monitor

The Hawk, an AC Power Quality Monitor introduced by Electronic Protection Devices, detects voltage fluctuations and sounds an alarm and lights up when an increase or decrease in power occurs.

The Hawk is also trained to devour sub-microsecond over-voltage line transients from the circuit and

(continued on page 180)

FASTER THAN 5 NANO-SECONDS, STRONG AND SOLID STATE
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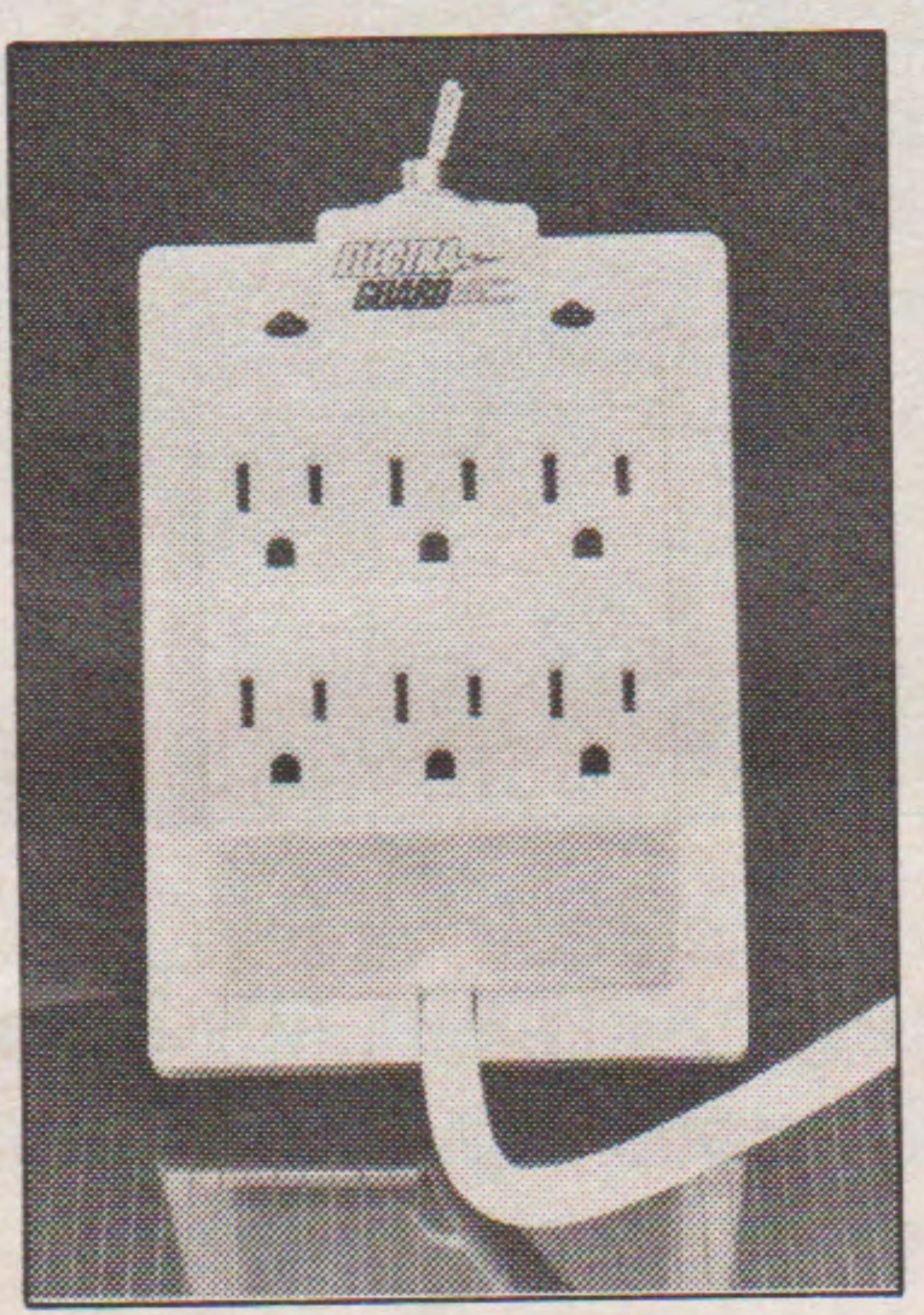


\$49.95 to \$79.95
Electra-Guard System 2 (above left) keeps six devices safe from over-voltage. Cost: \$49.95. The System 4 (center), with EMI/RFI filter, protects 3 devices from overvoltage and electronic noise. Cost \$79.95. Electra-Guard System 6 (far right) has an on/off

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EPS Computer Power Solutions, Inc.
8800 49th Street North, Suite 203
Pinellas Park, FL 33565

Write No. 114 on Inquiry Card

Products *(continued)*

provide electrical noise filtering. *Electronic Protection Devices, Waltham, MA.*
Write No. 326 on Inquiry Card

VHR19 - Color Graphics Terminal

Intecolor Corporation, an operating company of Intelligent Systems Corp., recently announced the Intecolor VHR19, a new color graphics terminal.

The VHR19 is designed for applications where color, speed and Tektronix 4014 compatibility are needed, according to the makers. The VHR19 has 1024 by 1024 resolution with 1024 by 768 viewable. A total of 4,096 colors are included, with eight concurrently displayable on a 19", bit-mapped display.

The VHR19 supports full graphics

commands, including point, line, polyline, rectangle, circle, arc, polygon fill, color, zoom and pan. Four sizes of Tektronix character sets are included, plus two graphics character sets, one of which is user-definable.

The Intecolor VHR19 also is compatible with DEC's VT100 and the industry standard ANSI X3.64 communications protocol. The detached, full-size, step-sculptured keyboard has 113 keys and supports 36 programmable function keys. *Intecolor, Norcross, GA.*

Write No. 312 on Inquiry Card

MDBS III - for Wicat Systems

Wicat Systems, Inc., recently announced the availability of MDBS III, a post-relational extended network data base management system, on Wicat's range of 68000-based supermicros.

The MDBS III, developed at Micro Data Base System, Inc., is supported by Wicat's proprietary operating system, MCS and UNIX. This system allows the developer to use natural English to describe the various relationships among data types in the data base.

MDBS III also includes many features ranging from data integrity and security, automatic recovery from system crashes, multiple concurrent use, data independence and more. *Wicat Systems, Orem, UT.*
Write No. 318 on Inquiry Card

Personal Instrument for IBM Computers

Northwest Instrument Systems Inc., (NWIS) recently announced the Interactive State Analyzer can now be connected to computers from Apple and IBM.

NWIS also has released its Model 2100 Interactive State Analyzer for the Apple II+ and IIe. It adds 16-channel logic analysis capability to debug microprocessor hardware and to design software. With the additional IBM compatibility, NWIS personal instruments address more than 60 percent of the personal computer market. The NWIS product will work on IBM-compatible products, such as the Compaq portable computer. *Northwest Instrument Systems, Inc., Beaverton, OR.*

Write No. 309 on Inquiry Card

Enhancements for CAD Applications

Sun Microsystems Inc., recently introduced hardware and software enhancements for its family of networked technical workstations for engineering, scientific and computer-aided design and manufacturing (CAD/CAM) applications.

Sun Workstations—Models 100U and 150U—are now available with a 10 MHz Motorola MC68010 microprocessor with demand-paged virtual memory and an advanced version of the UNIX operating system. At the

Bring Logo To Life With ... TURTLE TOT™



MMeet Turtle Tot, a small programmable personal robot and discover how Tot quickly becomes the star of your classroom's Logo environment. Like the Logo screen turtle, Tot is controlled by Logo commands and can move, turn and draw. What's more, Tot can also blink its eyes, feel through touch sensors and even talk!

Tot was created to make the turtle concept come alive. Students easily identify with a turtle that can be seen, heard, touched, followed and held and which does things they do themselves intuitively -- like move, draw, feel and talk -- and translates them into commands a machine can understand. As students' programming ambitions grow, Tot keeps up with them.

The Tot can be used with just about any microcomputer through an RS-232 serial interface and is easily controlled in Logo, BASIC or any other high-level computer language. Every Tot comes completely assembled and fully-tested before shipment.

Turtle Tots are available now for \$299.95. To order your Tot or for more information, please contact:

Harvard Associates, Inc.
260 Beacon Street
Somerville, MA 02143
(617) 492-0660 or see your local computer dealer.

Write No. 93 on Inquiry Card

same time, Sun announced a new disk sub-system that provides 474 megabytes of secondary mass storage.

The new Sun processor, incorporating an MC68010, provides 16 megabytes of virtual address space a process. The demand-paged virtual memory feature lets each process use the complete addressing range of the 68010 while the system transparently moves user data between physical memory and secondary storage.

The Sun memory management design supports up to two megabytes of physical memory with no wait states, making all main memory as fast as cache memory. The new processor also implements direct memory access and provides a time-of-day clock with battery backup. *Sun Microsystems, Inc., Mountain View, CA.*

Write No. 310 on Inquiry Card

Standard, Extended Color Computers

Radio Shack recently introduced TRS-80 16 Kb Standard Color Com-



IMPROVED COLOR COMPUTERS

puter 2 and the TRS-80 16 Kb Extended Color Computer 2.

Both computers are designed for anyone who wants to enjoy video games in a system that can be used for many other household, business and educational tasks.

The Standard Color Computer 2

attaches to any television set. It comes with Standard Color BASIC language, including data and string handling, dimensioned arrays, math functions and nine-digit numeric accuracy. A 308-page beginner's manual included with the Standard Color Computer 2 teaches how to write programs with color displays and sound. *Radio Shack, Fort Worth, TX.*

Write No. 328 on Inquiry Card CP/M-Based PC

TeleVideo Systems Inc., recently introduced a low-cost 8-bit CP/M-based personal computer equipped with a high-capacity Winchester disk drive and powerful graphics functions. Called the TS803H, the system is designed for a variety of applications in small- and medium-size businesses.

The TS803H features a half-height 5-1/4" Winchester disk drive with ten megabytes of storage, along with a 500-kilobyte, half-height 5-1/4" floppy disk drive. For business graphics, the system includes as standard features Digital Research's GSX-80 graphics driver software and a high-resolution, 640-by-240 pixel display.

In addition to its capacities as a stand-alone personal computer, the TS803H can be linked to other 8- and 16-bit TeleVideo microcomputers in the TeleVideo Personal Computer Network. The computer is based on the Z80A microprocessor and has 64 Kb of RAM, expandable to 128 Kb. The system has a 14" display and a full-function keyboard with 16 function keys and an accountant-style numeric pad. *Tele-video Systems, Inc., Sunnyvale, CA.* Write No. 306 on Inquiry Card

Video Option for Professional 350

Digital Equipment Corp., recently released a multi-media "video learning station" that incorporates a hardware/software option for the Professional 350 personal computer.

The Interactive Video Information

System (IVIS) integrates moving or still television pictures with computer-generated text and graphics on the Professional 350 color monitor. To support the system, Digital also has announced programs for courseware development, courseware acquisition, and consulting services.

The option accepts two external video sources such as videodisc, videotape, video camera, or other live video devices. The system will control several models of industrial laser videodisc players. Two selectable audio inputs are provided, allowing use of stereophonic soundtracks or bilingual narration. An audio output capability is also available through the Professional 350 computer's optional Telephone Management System (TMS). *Digital Equipment Corporation, Maynard, MA.*

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IN OUR NEXT ISSUE

"Instructional Techniques," as modified by the absorption of high technology into virtually every level of education in America, will be featured in the February 1984 issue of T.H.E. Journal.

U.S. Secretary of Education T.H. Bell reveals results of a national survey of existing needs and capabilities, extracted from a report he presented to a Congressional subcommittee looking into the current state of education in America.

Wisconsin's Dr. James S. Evans describes how students actively use an interactive computer system in their day-to-day coursework at a

smaller college in his article on "Instructional Computing in the Liberal Arts: The Lawrence Experience."

Dr. Jeanne Smith, now a professor of mathematics, provides an "Evaluation of Telecourse Achievement at Saddleback College" in Southern California, a project that was the subject of her thesis for her Ed.D. degree from **Nova University**.

A practical and theoretical review of computer-aided instruction system costs for small-scale instructional and training programs will be presented by **Israel Pressman** and **Bruce Rosenbloom**, of **Baruch College** at the **City University of**

New York.

"An In-Service Instructional Program Using a Computer-Based Communication System" will be described by **John J. Manock**, of the **University of North Carolina at Wilmington**, and **Roger H. Lumb**, of **Western Carolina University**.

Together with details of new hardware and courseware being introduced at one of the computer industry's largest trade shows, these and other leading educators will share their expertise in the February issue of T.H.E. Journal — education's largest technical publication.

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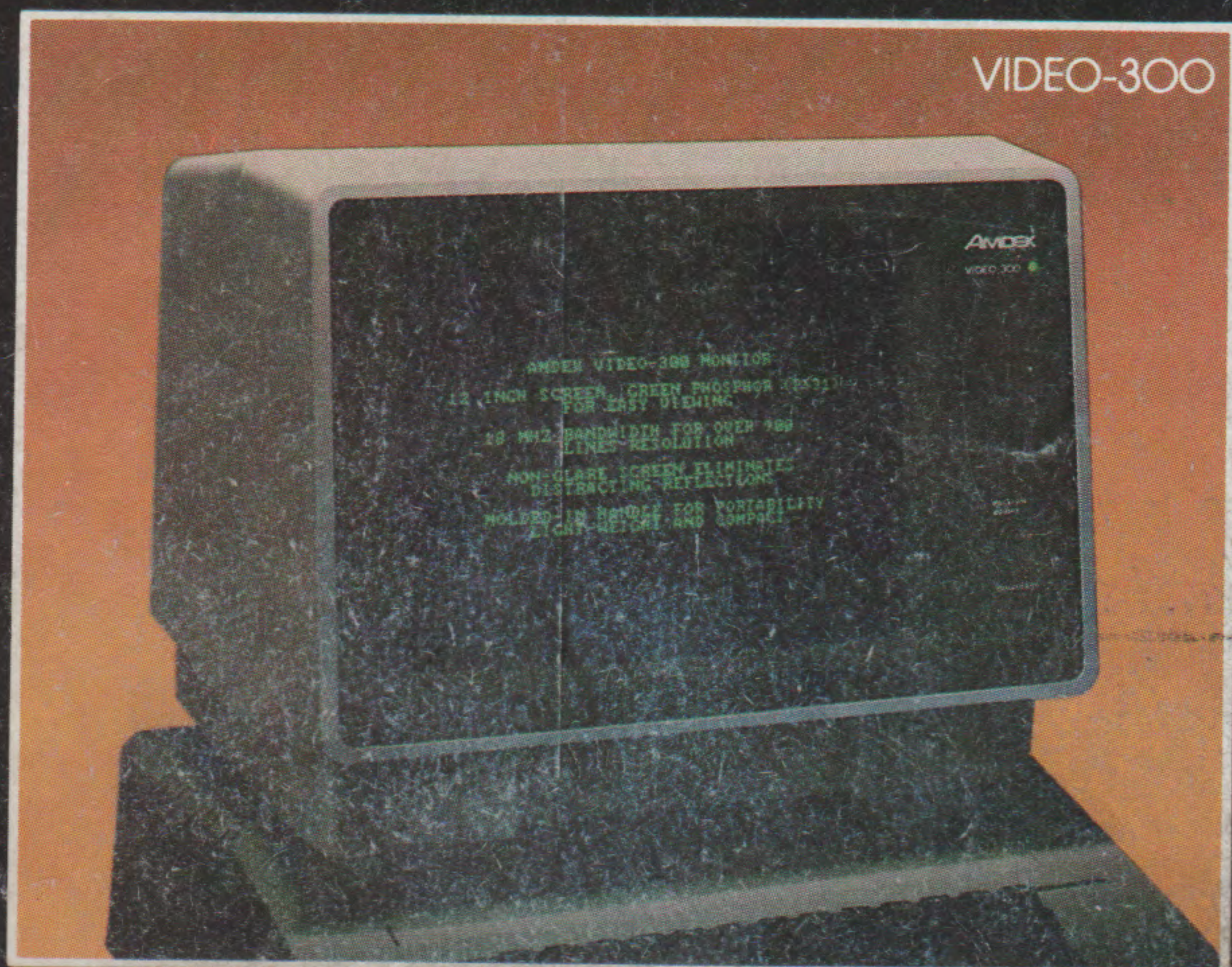
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